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Traditional male circumcision and the risk for HIV transmission among men: a systematic review

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ABSTRACT

Objectives The aim of this study is to synthesise evidence of how TMC practices contribute to HIV transmission among males and the impacts of HIV on themselves and their families.

Design The systematic review uses Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA).

Data Source PubMed, CINHAL, SCOPUS, ProQuest, Cochrane database, and Medline with no year limit.

Eligibility criteria (i) included young men, young male adults, male adults, mixed participants males and females; (ii) studied on TMC involving men living with HIV (married and non-married); (iii) studied on TMC, HIV transmission and impact in Low Middle Income Countries (LMICs) and developed countries; (iv) qualitative, quantitative and mixed method studies, and (v) aimed at exploring the TMC and how it contributes to HIV transmission and the impacts of HIV on circumcised men and their families.

Data extraction Data were extracted based on study details, study design, characteristic of participants, and results. Studies were also critically appraised using critical appraisal tools developed by the Joanna Briggs Institute (JBI).

Result A total of 18 studies were included: 11 were qualitative studies, 5 were quantitative studies, and 2 were mixed-method studies. All the studies included were conducted in areas where traditional male circumcision was performed (17 in Africa and 1 in Papua New Guinea). The findings of the review were categorized into themes namely TMC as a cultural practice, consequences of not being traditionally circumcised on men and their families, and TMC-related risk of HIV transmission. The review showed that TMC and HIV risk could bring significant and negative challenges for men and their families.

Conclusion The findings indicated the need for targeted health intervention programs and efforts to address psychological and social challenges in communities practicing TMC.

Prospero Number Registration: CRD42022357788.

Strengths and limitations of this study

- The first known study on TMC, the risk for HIV transmission and impacts on them and their families.
- A systematic search of six databases was conducted and results was reported according to the systematic review uses Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA)
- The inclusion of qualitative, quantitative, mixed methods helps the researchers to collate the current knowledge and knowledge gaps aimed the risk factors and impact of TMC on men and their families.
- The literature review only included articles published in English and the authors may have missed the topic reported in other languages.

1. Introduction

Circumcision is a cultural practice older than written history can explain, can be traced back to pre-Abrahamic times, and can be found in many Judeo-Christian traditions in Africa [1, 2]. It may be also one of the oldest human surgical procedures in the world [3]. It is a practice that has been widely performed on boys and young men by cutting off the foreskin of the penis as a rite of passage to mark the transition from childhood to manhood, primarily for religious and cultural reasons/beliefs [4, 5]. In many parts of the world, it has traditionally been practiced in Africa, Asia, Australia, Polynesia, and South and North America [3]. From the late 19th century onwards, circumcision is not only seen as a cultural or religious practice/identity, but also a public health approach [6]. In the 1980s, observational studies came up with the hypothesis that circumcision might protect against Human Immunodeficiency Virus (HIV) transmission [7, 8].

Male circumcision has been identified to provide significant protection against HIV transmission and other sexually transmitted infections (STIs) in men [11-16]. This has been proven by Randomised Controlled Trials in South Africa, Kenya, and Uganda [15, 17, 18], showing that circumcised males were less likely to become infected with HIV. As a result, male circumcision is increasingly recommended as a strategy to reduce HIV transmission, particularly in areas of a high prevalence of HIV [19-28]. A report from the World Health Organization and the United Nations has also highlighted a correlation between the lack of male circumcision and higher HIV rates, specifically in Eastern and Southern Africa [29]. However, skepticism has also been raised regarding the protective effect of male circumcision on HIV transmission: some previous studies failed to prove the correlation between male circumcision and HIV infection prevention [30, 31], while some other studies found circumcision increased the risk of HIV transmission [32, 33]. Such skepticism seems to be supported by some evidence from Japan and Scandinavian countries showing that the percentage of circumcised men is low, but the prevalence of HIV cases in these counties is also low [34]. Furthermore, factors such as sexually active behaviors prior to circumcision, religion [35], history of STIs, and age [7] have been reported to be overlooked in the findings of randomised trials. These factors have also been as supporting reasons for doubt about the strength of the relationship between male circumcision and HIV transmission prevention.

Similar to medical circumcision, the protective benefits of traditional male circumcision (TMC) have been a common question. Some evidence has suggested that TMC provides less or no protection from HIV transmission due to less amount of foreskin removed [36-38]. Newly traditionally circumcised males are also considered to have minimal protection if they have sexual intercourse before the wound heals completely [15, 39]. The possibility of acquiring HIV infection through TMC is also considered high due to sharing of a surgical knife or blade on multiple men [24, 40-43]. TMC refers to the procedure of removing the foreskin on males in a non-clinical way by traditional circumcisers without formal medical training [44]. In addition to preparing newly circumcised males for the transition to manhood, TMC symbolises new initiates officially being accepted in the community with a new status of being a man and becoming a good model in family and society [45-47]. TMC also denotes that new initiates have a greater social responsibility to their families and community, act as negotiators in community disputes,

and have a chance to learn about the community's problems [19, 20]. These symbolisations highlight TMC as a sacred and secret rite. For example, in Africa, initiates are forbidden to talk with outsiders about the circumcision ritual and those who undergo the ritual as it will cause severe punishment imposed by the community [48, 49]. Similarly, sanctions will be imposed on females and non-circumcised males who gain information about the ritual [50]. To some extent, due to its sacredness, the further consequences of TMC practice have become a challenge for health intervention programs.

Studies on male circumcision and the risk for HIV transmission have been conducted in many parts of the world including low- and middle-income countries (LMICs) and developed countries. Although TMC is still practiced in a number of countries, and its healing process may have a high risk of HIV and other STIs transmission, to the authors' knowledge, there have been no published systematic reviews on TMC, HIV risk, and impacts on circumcised men and their families. Thus, the authors consider it important to conduct a systematic review to synthesise evidence of how TMC practices contribute to HIV transmission among males and the impacts of HIV on themselves and their families. To determine whether a previous systematic review exploring this theme had been completed or is in progress, we conducted a preliminary search in PubMed, CINHAL, Scopus and in International Register of Systematic Reviews (PROSPERO) and found no underway systematic review on this topic in LMICs and developed countries. Therefore, this systematic review is needed to fill the gap and to help inform future health efforts at all levels including health practitioners, researchers, and policy makers.

2. Methods

2.1 The Systematic Search Strategy

The protocol for the systematic review has been registered with PROSPERO (registration ID: CRD42022357788) [51] . The systematic search started with an initial search following the PICO (Population, Intervention, Comparison and Outcomes) framework, which has been used as part of the WHO guidelines development process to inform evidence-based practice The systematic search was developed in collaboration with a health librarian expert, and the search terms were adjusted by each database. Databases searched included PubMed, CINHAL, SCOPUS, ProQuest, Cochrane, and Medline. The search was limited to the English language, and with no year limit in order to capture as many articles as possible about circumcision, traditional male circumcision, HIV, and impact on men and their families. The search strategies for the databases are in appendix 1. Medical Subject Headings (MeSH) were used as part of the search strategies. The search terms were formulated using the combination of key terms or the synonym of each concept using boolean terms (OR, AND). In addition to electronic search, Google scholar and google were used to search grey literature. Reference lists of all relevant articles were also scrutinised to identify articles that were not recaptured by electronic database search. The search was conducted 15 – 30 October 2022. The combination of key terms including the synonym of each concept is in table 1.

Table 1. Search terms

Concept and search items
#1. Circumcision OR male circumcision OR traditional circumcision OR traditional initiation OR traditional male initiation OR TMC OR traditional male circumcision OR indigenous male circumcision OR traditionally circumcised OR traditionally circumcised male OR open circumcision OR traditional men circumcision OR sifon OR traditionally circumcised men OR traditionally circumcised husband OR traditional practice of male circumcision OR practice of traditional men circumcision OR ritual traditional circumcision OR ritual initiation
#2. HIV infect* OR HIV prevention OR HIV control OR human immunodeficiency virus OR AIDS OR sexually transmitted infections OR risk of HIV infection OR HIV transmission OR sexually transmitted diseas*
#3. impact* OR psychological wellbeing OR distress OR economic impacts OR social effect OR stigma OR discrimination OR unproductive husband OR loss of job OR loss income OR health impacts OR powerlessness OR worthlessness OR social distance OR social isolation OR stress OR mental health
#4. developing countries OR less developed OR disadvantaged OR resource limited OR poor OR low* OR middle income* OR region* OR area* OR low resource regions OR resource limited regions OR resource limited countr* OR developed countries OR pacific countries
Search combination #1 AND #2 AND #3 AND #4
The search will be applied in different databases: PubMed, CINHAL, SCOPUS, ProQuest, Cochrane database, and Medline.

2.2 Inclusion and Exclusion Criteria

The review included qualitative, quantitative and mixed method studies and evidence syntheses (systematic reviews). We also reviewed unpublished studies from reports and policy documents from google, google scholar, and WHO websites by applying relevant search terms. A summary of inclusion and exclusion criteria is shown in table 2.

Table 2. Inclusion and exclusion criteria

PICO acronym	Inclusion criteria	Exclusion criteria
P-Population	Young men, young male adults, male adults, mixed participants males and females	Infant, children, women, female

	Studies on TMC involving men living with HIV (married and non-married) Mixed gender (male and female) but with explicit evidence on male	
I- phenomenon of Interest	TMC, HIV transmission and impact	Medical circumcision and its impact and voluntarily medical male circumcision (VMMC)
Co-Context	LMICs and developed countries	
S-Study design	Qualitative, quantitative and mixed method studies. Literature reviews, reports, policy documents, ethnography, anthropology and social study	
Language	English	Other than English
Purpose of study	Studies aiming at exploring the TMC and how it contributes to HIV transmission and the impacts of HIV on circumcised men and their families	Studies aiming at exploring HIV risk factors and impacts on women
Text	Full text available	Only abstract
Year publication	No year limit	

2.3 Data Screening

All the identified articles (Fig. 1) were collated and imported into EndNote X9 (Clarivate Analytics, PA, USA). The search identified a total of 3,041 articles. Duplicates (n=690) were removed using EndNote. The titles and abstracts of the remaining 2,359 articles were screened, further removing a total of 2,118 articles due to irrelevant populations and focus or aims. In total, 241 articles were examined in full text for eligibility. Of this, 222 articles were excluded due to not meeting inclusion criteria and one article not meeting methodological quality. After full text examination, 18 articles fulfilling inclusion criteria were finally included in the review (Supplementary file 1). The 18 articles were then were assessed for methodological quality using critical appraisal tools developed by the Joanna Briggs Institute (JBI) for study design [56]. The

methodological quality assessment was performed by the authors GAA and NKF. Uncertainty was resolved through discussion among the three authors. The screening process of the articles is reported and presented according to the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) flow diagram (Figure 1) [57].

2.4 Data Extraction and Data Analysis

For each included article, data extraction was conducted with an extraction sheet. In the sheet, we recorded (i) study details: the last name of the first author, year of publication, study setting; (ii) study design: type of study, study aim, analysis methods; (iii) characteristics of participants: population, sex of participants, age of respondents; and (iv) results: the main themes, including TMC as a cultural practice, the impact of not being traditionally circumcised and the risk for HIV transmission (Supplementary File 2). The analysis followed three-stage procedures by Thomas and Harden framework [58]: (i) coding the text line by line, interpreting the data, and identifying concepts or themes; (ii) developing descriptive themes by groping similar concepts in theme and sub-theme; and (iii) generating analytical themes by reviewing preliminary themes and discuss the addition or revision of the themes. The final analytical themes were then reviewed and decided as presented below.

2.5 Patient and public involvement

This study used published studies and did not include patients and public involvement.

3. Result

3.1 Characteristic of Included Studies

All included articles were published in English and were published from 2003 to 2020. The detail of the description of the studies is in Supplementary Table 1. Among the 18 included publications, 11 were qualitative studies [39, 59-68], 5 were quantitative studies [69-73] and 2 were mixed methods [74, 75]. All the studies included were conducted in areas where traditional male circumcision was performed. A total of 48,468 participants were involved in the review, of whom 1055 and 47,413, respectively, were involved in qualitative and quantitative studies. 11 studies involved male only [62-67, 70-72, 74, 76], 7 studies involved men and women [39, 59-61, 69, 73, 75], 2 studies involved traditional circumcisers [61, 62], and 1 study involved health practitioners [61]. Participants' ages ranged from 13 to 70 years old, however, 2 studies did not report the participant's age [59, 63]. Most of the studies (n=17) were conducted in Africa while 1 study was conducted in Asia (Papua New Guinea) [59].

Key findings were grouped into three main themes, including (i) TMC as a cultural practice, (ii) TMC and challenges of not being traditionally circumcised on men and family, and (iii) TMC and the risk for HIV transmission. Finally, knowledge gaps were identified.

3.2 TMC As a Cultural Practice

It is widely recognized that TMC is practiced by various cultural groups among men as a rite of passage from childhood to adulthood. To the search, TMC is mostly practiced in LMICs in Africa and Asia. Thirteen studies [39, 59, 60, 62, 63, 65-68, 73-75, 77] discussed about TMC as a cultural practice: process of TMC, TMC as a secret and sacred practice, and reasons to undergo TMC.

3.2.1 Process of TMC

Of the fourteen studies, seven studies [59, 60, 62, 63, 66, 67, 75] described three steps of TMC ceremony, including separation from family and community, transition, and incorporation into the family and community. In separation step, new initiates were taken to a mountain or camp for weeks or months [63, 75]. This long period was reported adequate time for healing process and learning about manhood [63]. The separation was meant for new initiates to demonstrate survival skills, such as ability to endure the pain which could improve men's quality such as strength, courage, respect and fortitude [60].

Transition process is a step where initiates were taught about the social norms, cultural knowledge and community expectation for them so that they could socialize with their nuclear family, friends, and community [67]. For example, a study in Papua New Guinea [59] found that new initiates were taught about what they have as a clan, such as their ancestral values and spirit, their clan's history, status, the land, the forest and the sea. Three studies [63, 66, 75] discussed about expectations in initiate's families and communities after being traditionally circumcised which is in line with a study [78] reporting new initiates were expected to be a role model, have the ability to protect family, solve family disputes, and refuse tasks considered as a female domain. In the community, they were also expected to have sense of belonging to the community, take greater responsibilities (avoiding criminal activities and abuse of women), be able to cooperate with elders, and have the ability to face difficulties in the future.

In addition to learning about family and community, several studies [67, 75] reported that new initiates were taught about sexuality during TMC ceremony. A study in Limpopo, South Africa [60] found that sexual socialization during TMC puts an emphasis on sexual control and sexual reserve rather than "permit to sex." For example, initiates were taught that if they did not wait long time to have sexual intercourse after being circumcised, their foreskin will grow again, and therefore, they have to undergo a new circumcision which is more painful [67]. However, other findings [67, 75] discovered that the emphasis of sexuality during circumcision has been changed with circumcision as a "license" for sex including unsafe sex behaviors. These studies support the findings of another study reporting that traditionally circumcised men tended to assume that they had unlimited and unquestionable rights to have access to sex [78].

Incorporation process was marked by the return of initiates to the family and community. In South Africa [67], upon returning new initiates wore a new dress code symbolizing new circumcised men reentering family and community as a new individual or a transformed individual who were ready to fulfill new roles in their society. This process is marked with celebration by slaughtering animals (a goat or a sheep) as a sign of thanks to ancestors, family and community [63]. A study in Papua New Guinea found that incorporation was marked with having a celebration or party with family and community [59]. Celebration of successful

traditional circumcision draw symbolic power of being custodians of cultural practices resulting in a sense of community, social identity, and belonging [62].

Three studies [40, 62, 70] described TMC as an incomplete or partial circumcision where not all foreskins were removed. This is usually performed in non-clinical settings by traditional circumcisers without formal medical training. The left foreskin is considered the same as not being circumcised as the foreskin keeps semen in the penis, thus, making them "dirty" and vulnerable to easily being infected with HIV and other STIs infections compared to full circumcision (medical circumcision) [62]. Findings showed that TMC, similar to medical circumcision, may reduce the risk of HIV and other STIs, however, the amount of foreskin removed during the ceremony determines the extent of effectiveness against HIV transmission.

3.2.2 TMC As a Secret and Sacred Practice

Six studies [59, 60, 62, 63, 67, 73] described TMC as a sacred, secret, and compulsory cultural practice in communities. As a sacred and secret practice, TMC was conducted with certain rituals in certain places and performed my certain people (traditional circumcisers). In Tanzania, the traditional circumcisers were appointed by ancestors through dreams, and the skills were passed from one person to another through observation [62]. Meanwhile, in Xhosa, South Africa, the skills were taught by elder circumcisers through apprenticeship [63]. Ritual ceremony was performed by traditional circumcisers or clan leaders prior to circumcision. Similarly, as a compulsory practice, all men within community were required to undergo such practice. Secretness is also marked by separation or isolation. Studies in Africa found that secretness is marked by isolating or separating new initiates from their families and communities [63, 67]. Similarly, a study in Papua New Guinea [59] found that TMC was performed in a designated home for exclusive use of men where only men were allowed to witness the actual process.

The cultural practice of TMC in Africa and Asia does not allow women to be around the ceremony and view or have knowledge of the process of TMC. It is believed initiates will be affected by witchcraft and experience slow recovery process if women were present during the ceremony. However, women in Papua New Guinea [59] were found highly knowledgeable about the whole process of TMC, able to explain in detail the cutting process, the procedures and the disposal of blood. The role of women in the community in Papua New Guinea was to start preparing for welcoming new initiates such as making food, buying pigs to be eaten during celebration, singing, dancing and giving gifts.

The sacredness of the TMC was reported to be related with the initiate's ancestors intervention as highlighted in two studies [62, 63]. In South Africa, ancestors were reported to be involved in TMC process and wound healing following circumcision. Long healing wounds or not healing properly is associated with sexual impurity. For example, in Monduli, Tanzania [73], it was believed that the wound took two weeks to be completely healed for initiates who had not engaged in sexual intercourse prior to circumcision, and took more than one month for the exposed ones. Due to this, in certain communities, initiates were asked to repent their sins so that the wound heals quickly [63].

3.2.3 Reasons to Undergo TMC

Ten studies [39, 59, 62, 63, 65-68, 73, 74] describe rationales for TMC. These studies underlined an obligation for performing cultural rites to prepare new initiates for the responsibility of adulthood as the main reason for TMC. A qualitative study in South Africa [39] found that men and women underlined the importance of TMC to live up to cultural values and community expectations. They believed that traditionally circumcised men were more mature, less abusive, and more responsible, compared to non-traditional circumcision as they had received teachings during ceremonies. Furthermore, learning social norms, cultural values and men's related values such as being tough and brave to take risk were aspects that were only found in traditional circumcision and not in medical circumcision [79]. This reason seemed to significantly influence initiates' resistance to the modern medical circumcision. Expecting the privilege of being accepted and being together, such as having meals in the same dishes with the circumcised ones, was also a supporting factor for men to undergo TMC [74].

Four studies [73, 77, 80, 81] described about economic reasons to undergo TMC. Low cost for TMC compared to medical circumcision was reported to affect initiate's and their family's decision [80]. Evidence from South Africa showed that new initiates could not afford to pay medical circumcision and the amount of money charged by legal traditional circumcisers resulting in new initiates took health risk visiting illegal traditional circumcision charging lower price [74]. Such evidence seemed to show that people who were economically vulnerable in traditional settings may only be able to access cheaper circumcision services with high risk of complication and potential risk of HIV transmission. Nevertheless, in many cases, the cost charged for traditional circumcision did not include the time the wound was fully recovered, complication requiring further medical treatment, and celebration of fully recovery [77].

Five studies [39, 59, 62, 66, 68] discussed the influence of women (e.g., girlfriends, future wives/partners), family, community and peers on men to undergo circumcision (TMC and medical circumcision). Evidence from South Africa showed that women often scheduled the appointment for their boyfriend or and husband to be traditionally circumcised [76]. Similarly, another finding in South Africa showed that women tended to undermine the manhood of non-circumcised males [66]. Also, a finding in PNG showed that women prefer circumcised men for marriage and as a sexual partner [59]. In addition to cultural reasons, women's preferences for circumcised men were related with pleasure and satisfaction during sexual intercourse compared to uncircumcised men [39]. Family, community and peers were also reported as significant influences for young men to undergo TMC [62].

3.3 TMC and The Consequences of Not Being Traditionally Circumcised on Men and Their Families

Eleven studies [39, 59-62, 64, 65, 67, 69, 73, 82] described the challenges of not being traditionally circumcised, including psychological impacts and social challenges. The details about these aspects are presented below.

3.3.1 Psychological Challenges

Psychological impacts including feelings of shame, stress, and embarrassment were common negative challenges experienced by men who were not traditionally circumcised [83]. Such challenges were supported by experiences of being asked by friends about when to undergo TMC [83]. Another stressor for such psychological challenges included feeling obligated to undergo the ritual. Similarly, uncircumcised men were negatively affected by community perception on masculinity and adulthood.

Social pressures associated with traditional circumcision was another stressor for psychological challenges facing young people in some settings. Several studies described about adolescents and young men in Africa who experienced social pressure from their family and peers for being medically circumcised and uncircumcised [39, 62]. For example, a number of men acknowledged that they decided to be traditionally circumcised because their fathers or brothers had undergone circumcision, leading them to feel obligated to undergo the same ritual [67]. Others pointed to the respect to culture or system they grew up with where all men underwent the same ritual [67]. In Xhosa community, South Africa, it was often uncircumcised men were called cowards by friends at the same age [67]. Therefore, the decision to be traditionally circumcised was to avoid being harassed and ridiculed. In the family context, pressure of young men to be traditionally circumcised stems from the desire to maintain the family honor [64].

Another significant pressure was from women. Studies found that boys felt pressure when asked by girl friends or partners about their circumcision status. A study in South Africa found that girls were considered trivial if dating and walking with uncircumcised boys [67]. They were also considered as not ready for building a relationship with women [64]. Another finding in Africa also showed that circumcision is beneficial for women who were married to men who were cheating as circumcision might protect against HIV transmission [67].

3.3.2 Social Challenges: Stigma, Discrimination and Disrespect

Seven studies [39, 59, 60, 64, 66, 67, 82] described stigma and discrimination related to TMC. A study in Xhosa, South Africa noted that 70% of Xhosa initiates felt that they would experience stigmatization if they were not traditionally circumcised [84]. In the same study setting, uncircumcised men and those underwent medical circumcision were stigmatized as boys who were immature and impossible to distinguish them from 'real men' [64]. Similarly, uncircumcised men in PNG [59] felt ridiculed, mocked and people made fun of those who were not traditionally circumcised. Indeed, uncircumcised men in PNG are referred to as *utilusa* (foreskin) instead of using their actual name. Such impact was not only experienced by the initiates but also the initiate's families in which the initiates' father and family were looked down by others within the community. For young uncircumcised men in Africa, stigma, discrimination, and rejection were

reported to have caused long-term psychological effects reflected in anxiety, personality change and lack of confidence [64].

It is also reported that uncircumcised men were treated differently and assumed negatively as reported in two studies [64, 67]. In the family and community, they were highly vulnerable, often blamed for any inappropriate actions and considered incapable of moral worth. For example, uncircumcised men are often accused of being liars and thieves and were also treated like animal (a dog) in their community [64]. Another study in Africa showed that uncircumcised men and those underwent medical circumcision would not be accepted in the community, not obtain rights and responsibility in their family, and had no rights to negotiate with elders [67]. Also, they are not allowed to start families within their community and are not allowed to inherit and have property on their own [64]. Such negative impacts were reported to affect uncircumcised men psychologically, such as feeling embarrassed, disadvantaged and having low/no moral worth.

A couple of studies also suggested that men who were uncircumcised and underwent medical circumcision did not earn respect from community [39, 67]. In some settings it is considered proper for the community not to respect men who failed to follow the rite of passage and this leads them to not receive the same status as other men [39, 67]. Uncircumcised men and those who failed to follow the ritual would be marginalized from traditional ceremony and community discussion [64]. These studies suggested that such consequence can lead to further psychological problems such as feeling sad, low self-esteem, feeling guilt, social withdrawal and frustration among traditionally uncircumcised men.

The social challenges, stigma, discrimination and expectation towards traditionally circumcised men underline cultural constructions of the penis and body which then leads to construction of masculinity and womanhood, which further raises issues of gender constructions [85]. The body functions metaphorically symbolize social status, tribal affiliation, family position, and gender [85]. Rite of passage indicated by ritual and social transformation plays significant roles in social interaction within community [85].

3.4 TMC and the Risk for HIV Transmission

Nine studies [39, 60-62, 69, 70, 72, 73, 75] described about (i) shared knife and bandage, unhygienic environment and the risk for HIV transmission; (ii) TMC promoted multiple sexual intercourse and increase sex partners, (iii) Belief in the protective effects of TMC against HIV/AIDS, and (iv) TMC and Knowledge of HIV Transmission.

3.4.1 Shared a Knife and Bandage, Unhygienic Environment and the Risk for HIV Transmission

Four studies [61, 62, 69, 73] highlighted the practice of one knife or blade used to circumcise several initiates. For example, the majority of participants in a study in Tanzania reported that one knife was used in all TMC ceremony [62]. Using one knife or blade to circumcise several initiates in one or several TMC ceremonies were reported to put initiates at high risk of being

infected with HIV and other STIs as some of the initiates may have had unsafe sexual intercourse prior to circumcision and may already be HIV-positive [69]. However, another finding [73] showed that some traditional circumcisers started using one knife or razor one for one initiate.

A study by Mpateni and Kang'ethe [61] also highlight the possibility of being infected with HIV and other infectious diseases through sharing bandage and unhygienic environment reflected in unclean areas around the ceremony and using unwashed dishes to eat. Such poor environment was supported by careless mistakes of traditional circumcisers who lack of knowledge of the importance of hygiene and the way the infectious diseases spread.

3.4.2 TMC Promotes Multiple Sexual Intercourses and Increases Sex Partners

Promoting multiple sexual intercourse in TMC was reported in five studies [39, 60, 61, 72, 75]. A qualitative study in Malawi [75] found stakeholders' concern on the role of TMC ceremony promoting sexual adventure among new initiates, asserting that circumcised men were not children anymore after they had sexual intercourse following circumcision. Similarly, there was also myths and false teaching that after being traditionally circumcised, initiates had to have sex with several females for testing of the penis [61]. As a result, many boys took this ceremony as a license to start having sex. This finding supports the finding of a study [60] that traditional initiation school had a strong influence on initiates sexual behaviors. This high sexual desire was reported to be supported by considerable amount of time they spent in the bush or camp during TMC ceremony without any contact with female [39]. Elsewhere, a qualitative study [39] found that traditionally circumcised men were told to have sexual intercourse without condoms to prove that they could enjoy flesh-to-flesh sex following the circumcision. As a result, some initiates continued to not using condoms following TMC.

Promoting sexual intercourse have led traditional initiates to increase the number of sex partners as reported in two studies [70, 72]. The study in Kenya found some initiates had more sexual desire following TMC, resulting in initiates increased their number of sexual partners. Such practice was reported to increase the transmission of STIs [72]. The study suggests the need of the synergy between traditional ritual and medical intervention for HIV preventive practice.

3.4.3 Belief in the Protective Effects of TMC Against HIV and Condom Use

Belief in the protective effects of TMC against HIV/AIDS transmission was also a risk factor which further affects initiates' sexual behaviors. Four studies [67, 71, 72, 86] discussed about beliefs in the protective effects of TMC. Traditionally circumcised men tended to believe that TMC offers complete protection against HIV and other STIs and that circumcision is an alternative of condom use [86]. A quantitative study in Eastern Cape, South Africa found that 97% of TMC initiates believed that TMC made initiates become a 'real man', and that they did not need to use condoms during sexual intercourse [72]. A study in Sub-Saharan African countries [70] found that traditionally circumcised males were less likely to use condoms following circumcision. This is similar with the findings from Eastern Cape [71], reporting TMM initiates were more likely to engage in risky sexual activities. Similarly, a cohort study in South Africa [72] found that 38% of

traditionally circumcised men reported inconsistent condom use when having sex, and 8% of them reported never using condoms.

3.4.4 TMC and Knowledge of HIV Transmission

Lack of knowledge of HIV and other STIs among initiates and traditional circumcisers were reported in five studies [60-62, 70, 72]. Similar to medical circumcision, TMC initiates also believed that TMC protected them from STIs such as syphilis and gonorrhea and enhances personal hygiene [62]. A cohort study [72] found that new initiates who went through traditional circumcision were mainly for cultural reasons, rather than HIV prevention.

Absence of information about HIV and other STIs prior to and after the circumcision was also reported as a HIV risk factor. For example, a study in Limpopo [60] found that traditional initiation school did not provide information about sexual health and HIV/AIDS and other STIs but tended to encourage new initiates to engage in risky sexual activities. Safer sexual behavior such as condom use and being faithful with one sex partner was not considered a part of initiation school programs. This was acknowledged by initiates, who said that they obtain the information about condom from local clinics and mass media [60]. A qualitative study in South Africa [67] found that absence of information has led to lack of understanding about the correlation between circumcision and HIV transmission.

Lack of knowledge of the mode HIV transmission was not only in TMC initiates but also among traditional circumcisers reflected in encouraging sex adventure, using one knife for several initiates, sharing bandages for several initiates, and ignorance of unhygienic environment [61]. A study in Tanzania [73] revealed that most of the traditional circumcisers did not associate between traditional circumcision practice and HIV/AIDS, assuming that HIV/AIDS was an urban disease. However, another finding of the same study also showed that careless mistakes performed by traditional circumcisers by not using any protection such as gloves when cutting the foreskin of the penis increased the risk of HIV transmission.

4. Discussion

4.1 TMC Practices and HIV Transmission

The findings show evidence that TMC as a cultural practice remains practiced in some communities in LMICs in Africa and Asia. The majority of the studies [39, 59-63, 65-68, 73-75, 77] reported that TMC in communities is not merely to cut off the foreskin but also to live up the tradition, keep the relation with their ancestors, and to teach and inherit cultural values and the values of 'manhood' to new initiates. The practice of TMC is highly valued as a secret and sacred practice, taking weeks and months from the separation step until the new initiates returned to the families and communities. Secretness and sacredness aspects in TMC may have led to difficulties to health intervention to control safety procedure. Such practice and its potential health risk factors reflects the high value the community puts on culture or tradition rather than any other types of medical or modern health intervention.

Studies in many communities in Africa found that TMC is a compulsory practice where all men were required to be traditionally circumcised, leaving challenges at individual and family level for those who did not undergo such practice. At the individual level, TMC causes psychological impacts for uncircumcised men and those followed medical circumcision including feeling ashamed, stressed, and pressured. These impacts were supported by the cultural values that put TMC as a standard of maturity of men. In addition to experiencing pressure from family and community, uncircumcised men also felt pressure from girls or women who preferred to build a relationship or to have sexual intercourse with traditionally circumcised men [39, 59, 62, 66]. Such impacts were also attributed for those who were not completely follow the process of TMC or mixed with medical circumcision. Although studies included in this review did not report the challenges of TMC on family, it is plausible to argue that family would be impacted if young men within the family did not undergo TMC.

Not undergoing TMC could also lead to negative social challenges such as stigma, discrimination, and disrespect towards men [60, 64, 82]. For example, those who did not undergo TMC could be labelled immature, irresponsible and easily ridiculed, humiliated, and mocked. In families and communities, traditionally uncircumcised men were stigmatized as the cause of any crime or irresponsible actions. Similarly, they did not have full rights to talk, discuss and negotiate with elders about families and communities' problems. They are labelled and treated without a respect (e.g., like a dog) which implies that they are considered less than human. Such impacts are in line with the components of stigma, such as labeling human differences, hegemony cultural practice associated labelled persons to undesirable characteristics, labeled persons are separated with the term "us" and "them", labelled persons experience loss of status and discrimination, and labelled persons experience difficulties in access to social, economic and political power [64, 87]. Similar to psychological impacts, all the studies included in the review mostly focus on stigma on initiates and thus less concern on stigma on family. Stigma, discrimination, and disrespect experienced by initiates prior to circumcision and uncircumcised men also reflect lack of social and psychological support from their families, friends, and communities.

TMC is generally assumed to have implications for HIV transmission [39, 60, 61, 69, 70, 72, 73, 75]. Unsafe procedure of TMC practices such as using one knife to circumcise several initiates, not wearing gloves when circumcise initiates, and unhygienic environment, raising the concern of on potential spread of infectious diseases, including HIV [61, 69, 73]. In addition to learn about culture and manhood in the transition period, initiates were also taught about exploring their sexuality, leading initiates to consider TMC as a 'gateway' to have unquestionable sex adventure and to have more than one sexual partner. For example, initiates were asked to have sexual intercourse with women who have had sex before as reported in a previous study. For example, initiates were asked to have sexual intercourse with women who have had sex before which is in line with another study [88] reporting that initiates were required to have sexual intercourse without protection several days before the wound heals as a way to speed up the recovery process The correlation between TMC and the risk of HIV transmission is also related with the belief that TMC has the same protective effects as using a condom. This belief may also be supported by the sacredness aspect of TMC rite, believing that the dead ancestors will intervene

in the health of the initiates as in line with previous studies [59, 73]. Another supporting factor for TMC and the risk of HIV transmission is lack of knowledge on the mode of HIV transmission. In some communities, safe sexual behavior was not part of the subjects taught during TMC rite, leading initiates to have no knowledge about HIV risk. This is in line with a finding in another study among 100 participants, of whom 67% of them were not aware of the risk of traditional circumcision for HIV transmission [89]. However, the risks for HIV transmission were also reported among initiates who had knowledge about HIV transmission. Findings of a previous study suggest that circumcised men who had knowledge about HIV preventive measure of male circumcision and believed that male circumcision could reduce the risk of HIV infection were more likely to engage in risky sexual behaviors or sex without condoms with multiple partners [90]. The risks for HIV transmission in the practice of TMC reflect lack of education, public awareness campaign and counseling for young men, parents, students, local leaders, and traditional circumcisers in the community practicing TMC.

4.2 Implications for Future Intervention

The systematic review provides a range of negative impacts of not being traditionally circumcised on men and scant information on the impacts on their families. Overall, the studies highlight psychological and social challenges that need to be addressed in communities practicing TMC. The studies also highlight TMC and the risk for HIV transmission which require future health interventions.

In this review, it is obvious that stigma, discrimination, and disrespect towards uncircumcised men or those who followed medical circumcision were within initiates' family and communities. This is because TMC is viewed more prestigious than any other circumcisions. It is suggested to have continuous counseling, approach, and education on communities where traditional beliefs and norms are still highly valued [60]. These approaches should reach not only family but also community and school. In light of the TMC and the risk for HIV transmission, it is noted that in some communities TMC has no role to play in preventing HIV and other STIs transmission such as promoting multiple sexual intercourse, not using condoms, and believing the full protection of circumcision against HIV transmission. To address this problem, education to target traditional circumcisers, traditional leaders, parents, and young men are required in order to improve the safe practice and prevent HIV transmission as reported in several studies [60, 77, 91]. Similarly, education on condom use and free, accessible condoms should also reach the camps where TMC practices were performed [60]. In addition, service delivery on providing free HIV testing for initiates in communities practicing TMC is needed.

4.3 Strengths and Limitations of the Study

Although many studies on male circumcision have been conducted mostly in Africa and some in Asia, this review is, as far as the researchers know, the first known study on TMC, the risk for HIV transmission and impacts on them and their families. The use of six databases and multiple search terms across 18 included studies helped the researchers conducted a comprehensive systematic review of the literature and provided a broad range of studies in LMICs and developed countries.

The inclusion of qualitative, quantitative, mixed methods helps the researchers to collate the current knowledge and knowledge gaps aimed the risk factors and impact of TMC on men and their families. Finally, the publications, the study selection methods, and the appraisal process altogether provided a substantial evidence that supports the key findings reported in the literature review. However, the literature review only included articles published in English which may have narrowed the scope and the authors may have missed the topic reported in other languages.

4.4 Implications for Future Studies

The review of the literature documents existing evidence and knowledge gaps about TMC, HIV risk, and its impact on men and their families. The review of the literature suggests that the previous studies mainly focus on the correlation on TMC and the risk for HIV transmission; none has explored TMC, HIV risk and its impacts on men and their families and none involved traditionally circumcised men living with HIV. Similarly, most of the included studies were in Africa settings, only one study was in Asia. Exploring TMC practice in different settings other than in Africa can help understand the similarities and differences of TMC practices and the implicaion on HIV transmission and its impact on men and their families. The review found very limited studies involved wives of married men who have done traditional circumcision and women that have unprotected sexual intercourse with newly traditional circumcised men to explore their views and sexual practices in relation to TMC. Furthermore, none of the included studies explored the views of health professionals and policy makers on TMC and its possible negative health consequences and how these have been addressed at policy level. Also, there is very limited studies exploring traditional circumcisers' views on the TMC and HIV risk. Future studies are required to fill these gaps of knowledge which may provide useful information for the development of specific interventions for safer TMC and preventing HIV and other STIs transmission.

5. Conclusion

The review presents three main themes namely TMC as a cultural practice, consequences of not being traditionally circumcised, and TMC-related risk of HIV transmission. These themes provide evidence that TMC and HIV risk could bring significant and negative challenges for men and their families. This review may be useful in designing programs to address social and psychological impacts associated with TMC practice in communities and integration of health intervention with medical circumcision.

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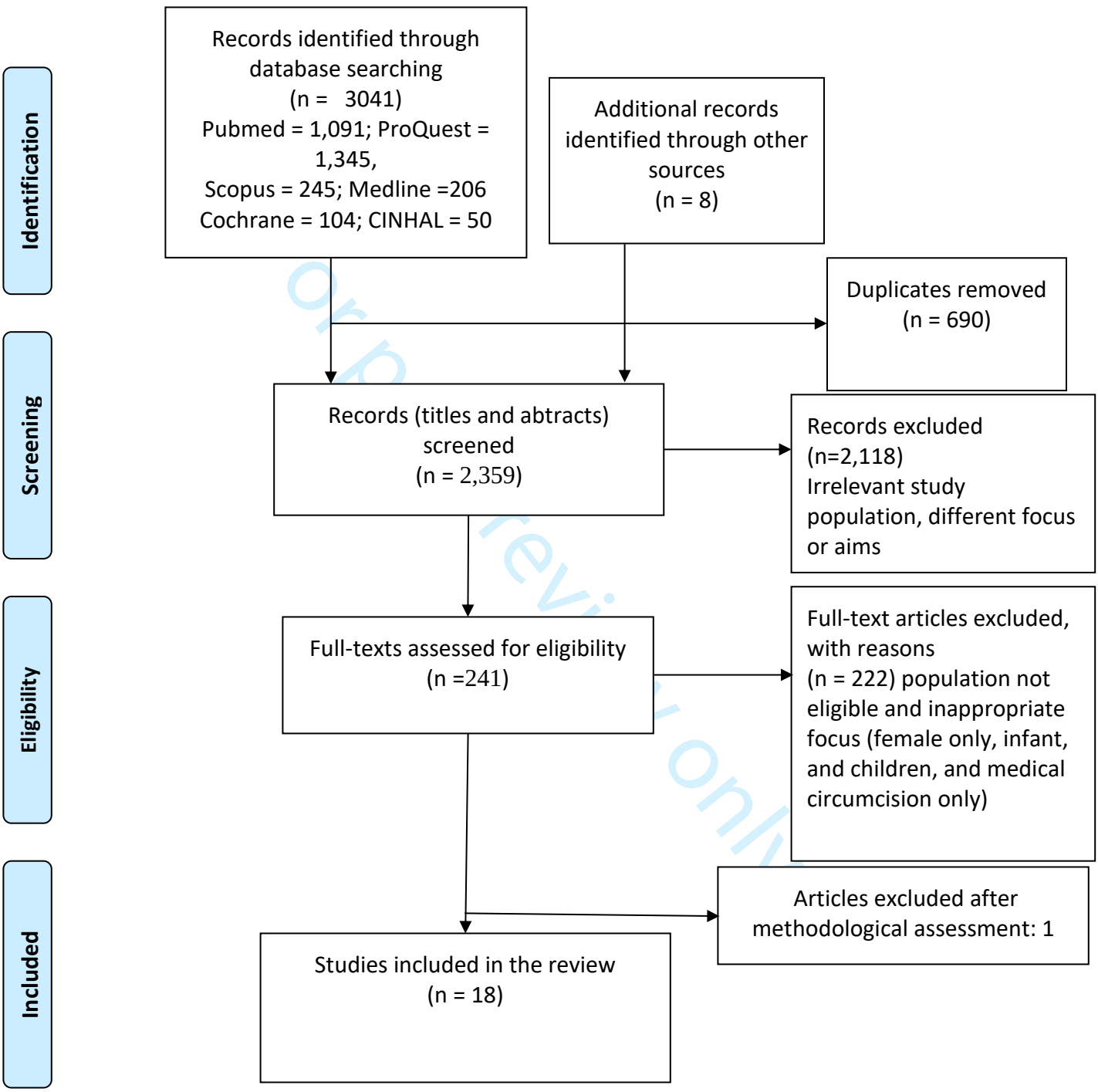
Figure 1: PRISMA Flow diagram of systematic literature search: records identified, removed, screened, and included in the review.



Supplementary file 1: Assessment of methodological quality (qualitative and quantitative studies) (n=16)

Authors	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	%
Greely, et al., 2013	Y	Y	Y	Y	Y	N	N	Y	Y	Y	80%
Gwata, 2009	Y	Y	Y	Y	Y	N	N	Y	U	Y	70 %
Kelly, et al., 2012	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	90%
Lagarde, et al., 2003	Y	Y	Y	Y	Y	Y	Y	Y			100%
Malisha, et al., 2008	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	90%
Mavundla et al., 2009	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	90%
Mavundla, et al.,2010	Y	Y	Y	Y	Y	N	N	Y	Y	Y	80 %
Mboera, et al., 2009	Y	Y	Y	Y	Y	Y	N	Y			87%
Mpateni, et al., 2020	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	90%
Mshana, et al, 2011	Y	Y	Y	Y	Y	N	N	Y	Y	Y	80%
Nyembezi, et al.,2009	Y	Y	Y	Y	Y	Y	Y	Y			100%
Nyembezi, et al., 2014	Y	Y	Y	Y	Y	Y	Y	Y			100%
Peltzer, et al., 2009	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
Amir, et al., 2012	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	90%
Shi, et al., 2020	Y	Y	Y	Y	Y	Y	Y	Y			100%
Siweya, et al., 2018	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	90%

Q= Question; Y= Yes; N= No; U= Unclear

The 2011 Mixed Method studies checklist (n=2)

Category of study	Methodological quality criteria	Responses		
		Yes	No	Can't tell
Douglas, et al., 2018				
Screening questions	Are there clear qualitative and quantitative research questions (or objectives), or a clear mixed methods question (or objective)?	Yes		
	Do the collected data allow address the research question (objective)? E.g., consider whether the follow-up period is long enough for the outcome to occur (for longitudinal studies or study components).	Yes		
1. Qualitative	1.1 Are the sources of qualitative data (archives, documents, informants, observations) relevant to address the research question (objective)?	Yes		
	1.2 Is the process for analyzing qualitative data relevant to address the research question (objective)?	Yes		
	1.3 Is appropriate consideration given to how findings relate to the context, e.g., the setting, in which the data were collected?	Yes		
	1.4 Is appropriate consideration given to how findings relate to researchers' influence, e.g., through their interactions with participants?	Yes		
	1.5. Is there coherence between qualitative data sources, collection, analysis and interpretation?	Yes		
2. Quantitative	2.1 Is the sampling strategy relevant to address the quantitative research question (quantitative aspect of the mixed methods question)?	Yes		
	2.2 Is the sample representative of the population understudy?			Can't tell
	2.3 Are measurements appropriate (clear origin, or validity known, or standard instrument)?	Yes		
	2.4. Is the statistical analysis appropriate to answer the research question (or objectives)?	Yes		
3. Mixed methods	3.1 Is the mixed methods research design relevant to address the qualitative and quantitative research questions (or objectives), or the qualitative and quantitative aspects of the mixed methods question (or objective)?	Yes		
	3.2 Is the integration of qualitative and quantitative data (or results) relevant to address the research question (objective)?	Yes		
	3.3 Is appropriate consideration given to the limitations associated with this integration, e.g., the divergence of qualitative and quantitative data (or results) in a triangulation design?	Yes		
	Overall	Yes		

Category of study	Methodological quality criteria	Responses		
		Yes	No	Can't tell
Munthali, et al., 2007				
Screening questions	Are there clear qualitative and quantitative research questions (or objectives), or a clear mixed methods question (or objective)?	Yes		
	Do the collected data allow address the research question (objective)? E.g., consider whether the follow-up period is long enough for the outcome to occur (for longitudinal studies or study components).	Yes		
1. Qualitative	1.1 Are the sources of qualitative data (archives, documents, informants, observations) relevant to address the research question (objective)?	Yes		
	1.2 Is the process for analyzing qualitative data relevant to address the research question (objective)?	Yes		
	1.3 Is appropriate consideration given to how findings relate to the context, e.g., the setting, in which the data were collected?	Yes		
	1.4 Is appropriate consideration given to how findings relate to researchers' influence, e.g., through their interactions with participants?	Yes		
	1.5. Is there coherence between qualitative data sources, collection, analysis and interpretation?	Yes		
2. Quantitative	2.1 Is the sampling strategy relevant to address the quantitative research question (quantitative aspect of the mixed methods question)?	Yes		
	2.2 Is the sample representative of the population understudy?			Can't tell
	2.3 Are measurements appropriate (clear origin, or validity known, or standard instrument)?	Yes		
	2.4. Is the statistical analysis appropriate to answer the research question (or objectives)?	Yes		
3. Mixed methods	3.1 Is the mixed methods research design relevant to address the qualitative and quantitative research questions (or objectives), or the qualitative and quantitative aspects of the mixed methods question (or objective)?	Yes		
	3.2 Is the integration of qualitative and quantitative data (or results) relevant to address the research question (objective)?	Yes		
	3.3 Is appropriate consideration given to the limitations associated with this integration, e.g., the divergence of qualitative and quantitative data (or results) in a triangulation design?	Yes		
	Overall	Yes		

Supplementary file 2

Author/year	Study Location	Study Design/Study Aim	Number/Age of Participants	Analysis	Main Themes of TMC, HIV risk, Impacts on Men and Their Families
Douglas, et al., 2018 [1]	Eastern Cape, South Africa	(i) Mixed method design (ii) Methods: • Cross-sectional survey • Focus group discussion (FDG) (iii) Aim: • to describe social determinants and explore economic determinants related to traditional circumcision of boys from 12 to 18 years of age in Libode rural communities in Eastern Cape Province	(i) Number of participants • 1036 men (ii) Participant age • 12-18 years old	Thematic analysis Descriptive statistics	**TMC and HIV risk** (i) TMC • TMC as a cultural practice • Reasons to undergo TMC (ii) HIV Risk • Initiates have no knowledge on TMC and HIV transmission • Initiates have no opportunities to talak about TMC and HIV risks
Greely, 2013 [2]	South Africa	(i) Qualitative design (ii) Method: FGD (iii) Aim: • to understand the importance of male circumcision as a risk-reducing strategy by exploring perceptions of young men and women	(i) Number of participants • 15 participants (10 men and 5 women) (ii) Participant age • 15 years and above	Thematic Analysis	**TMC, HIV risk, impacts on men and their families** (i) TMC • TMC as a rite of passage to adulthood • TMC defines being a 'real' man • Traditional initiates receive teaching and guidance from elders • Initiates received more respects • To fulfill or live up to cultural expectations (ii) HIV risk • Initiates were taught to have sexual intercourse • Initiates were keen to prove manhood with unprotective sex intercourse

					• The belief that TMC reduced risk of HIV transmission (iii) Impacts • Uncircumcised men were subject to stigma, discrimination, and disrespect • Uncircumcised men were haunted by bad luck • Women believed traditionally circumcised men are more responsible and less abusive
Gwata, 2009 [3]	Xhosa, South Africa	(i) Qualitative design (ii) Method: interview (iii) Aim • to explore the socio-cultural perceptions of Xhosa-speaking men on traditional male circumcision	(i) Number of participants • 5 men (ii) Participant age • 19-30 years	Thematic analysis	**TMC and HIV risk** (i) TMC • TMC as an agent of socialization within community • TMC tests man's ability to endure pain • Initiates experienced social pressure to undergo TMC (ii) HIV risk • Lack of knowledge on TMC and HIV transmission •
Kelly, et al., 2012 [4]	Papua New Guinea	(i) Qualitative design (ii) Method: • interview and FGD (iii) Aim • to map contemporary MC and other penile cutting practices, and the socio-cultural dimensions underpinning these practices	(i) Number of participants • 276 men (51 men underwent TMC) • 210 women (ii) Participant age Not reported	Thematic analysis	**TMC, HIV risk, impacts on men and their families** (i) TMC • TMC is a compulsory practice • TMC is sacred and secret practice (ii) HIV risk • Reusing of non-sterile cutting equipment • Lack of knowledge of risk of non-sterile equipment and HV transmission (iii) Impacts

					• Uncircumcised men felt stigmatized, ridiculed, and mocked • Family members of uncircumcised men were looked down within the community
Lagarde, et al., 2003 [5]	South Africa	(i) Quantitative design: • cross sectional study (ii) Aim • to measure the prevalence and associated factors of MC in a South African township, and to assess its acceptability as a tool for HIV prevention	(i) Number of participants • 482 men (108 underwent TMC) and 302 women (ii) Participant age • 19-29 years	Multivariate analysis	**HIV risk and impacts on men** (i) HIV risk • Circumcised men did not need to use condoms • The belief that TMC protected against HIV transmission • Initiates had sex during healing period (ii) Impacts • TMC proved manhood Initiates obtained respect from peers and women
Malisha et al., 2008 [6]	Limpopo, South Africa	(i) Qualitative design (ii) Method: interview (iii) Aim • to investigate the role and significance of traditional initiation schools from the perspectives of young people in Venda, a part of South Africa where initiation schools, for some young people, still form an important part of the rite of passage to adulthood.	(i) Number of participants • 17 men and 17 women (ii) participant age • 13-20 years	Thematic analysis	**TMC, HIV risk and impacts on men** (i) TMC • TMC prepares initiates to be a 'real' man • Initiation school is important for socialization (ii) HIV risk • Initiation schools encouraged initiates to engage in sexual activities • Lack of information on HIV and condom use during initiation school • Initiates engaged in sexual intercourse without a condom • Traditional healers did not use sterilised equipment. (iii) Impacts

					• Uncircumcised men experienced rejection • Uncircumcised men were considered not a 'real' man, irresponsible
Mavundla, et al., 2009 [7]	Xhosa, South Africa	(i) Qualitative design (ii) Method: interview (iii) Aim • to explore and describe Xhosa beliefs and practices regarding cultural male circumcision ritual in the Eastern Cape Province in South Africa to support nurses in providing culturally competent care	(i) Number of participants • 25 men (ii) participant age • Not reported	Thematic analysis	**TMC and impacts on men** (i) TMC • Process of TMC • TMC as a sacred and secret cultural practice • TMC did not allow initiates to seek for medical treatment • Expectation following being traditionally circumcised • TMC connects initiates with ancestors (ii) impacts • Uncircumcised men experienced rejection and negative labeling • Circumcised men obtained respect
Mavundla, et al., 2010 [8]	East London, South Africa	(i) Qualitative design (ii) Method: interview (iii) Aim • to describe the experience of newly initiated Xhosa men in East London, South Africa	(i) Number of participants • 14 men (ii) participant age • 15-20 years	Thematic analysis	**TMC and impacts on men** (i) TMC • TMC as a cultural practice (ii) impacts • Uncircumcised men experienced stigma rejection by family, community, peers, opposite sex • Uncircumcised men experienced lack of respect
Mboera et al., 2009 [9]	Tanzania	(i) Quantitative design: • Cross sectional study (ii) Aim • to underscore challenges and opportunities for the involvement of traditional	(i) Number of participants • 324 men and 277 women (ii) participant age • 12-45 years	Thematic analysis	**TMC, HIV risk, and impacts on men and their families** (i) TMC • TMC as a cultural practice • Reasons to undergo TMC (ii) HIV risk

		practitioners in scaling up safe male circumcision as a measure to support global efforts of preventing HIV transmission			• Using the same knife to circumcise several initiates • Lack of knowledge of the possibility of HIV transmission through TMC (iii) impacts • Uncircumcised men were segregated by community • Uncircumcised men experienced lack of respect •
Mpateni, et al., 2020 [10]	Alice, Eastern Cape, South Africa	(i) Qualitative design (ii) Method: FGD (iii) Aim • to examine the health hazards associated with the contemporary traditional circumcision rite in Alice, Eastern Cape, South Africa	(i) Number of participants • 23 male and 2 female (ii) participant age • 18-70 years	Thematic analysis	**TMC and HIV risk** (i) HIV Risk • Initiates have to have sex with several sexually experienced women • Unhygienic environment in camp or bush during TMC practices •
Mshana, et al., 2011 [11]	North Eastern, Tanzania	(i) Qualitative design (ii) Method: FGD (iii) Aim • to understand how traditionally circumcising communities where MC carries considerable social meaning and significance would respond to male circumcision (MC) program as an additional intervention against HIV infection	(i) Number of participants • 41 men and 50 women (ii) participant age • 18-44 years	Thematic analysis	**TMC and impacts on men** (i) TMC • TMC as a cultural practice • Process of TMC • Reasons to undergo TMC (ii) impacts • Uncircumcised men experienced stigmatization and ridiculing
Munthali, et al., 2007 [12]	Malawi	(i) Qualitative and quantitative design(ii) Method: • Cross sectional survey •interview	(i) Number of participants • 102 men and women (ii) participant age • 12-19 years	Thematic analysis	**TMC and HIV risk** (i) TMC • TMC as a cultural practice • Reasons to undergo TMC

		(iii) Aim: • quantitative data is used to examine timing of pubertal changes for boys and girls and the extent to which puberty is marked by initiation ceremonies and rites in the country. • Quantitative data is used in order to understand how adolescents know about issues relating to sexuality and what meanings they attach to various puberty changes as they experience them.		Descriptive statistics	(ii) HIV risk • Initiates had sex without protection • Lack of knowledge on TMC and HIV transmission • TMC promotes sex adventure for new initiates
Nyembezi, et al., 2014 [13]	Eastern Cape, South Africa	(i) Quantitative design: • cross-sectional study (ii) Aim: • to explore past sexual behaviors, reported substance use, and beliefs about initiation and male circumcision with regard to HIV prevention	(i) Number of participants • 1656 men (ii) participant age • Mean age 21	Logistic regression	**TMC and HIV risk** (i) HIV risk factors • Initiates had multiple sex partners • Initiates engaged in inconsistent condom use or unprotected sex with multiple sex partners • Belief that TMC protects against HIV and other STIs transmission
Nyembezi, et al., 2009 [14]	Eastern Cape, South Africa	(i) Quantitative design: • cross-sectional study (ii) Aim: • to report on the prevalence of consistent condom use and identify its psychosocial correlates to inform future HIV prevention strategies among traditionally circumcised men in rural areas	(i) Number of participants • 114 men (ii) participant age • 15-32 years	Logistic regression	**TMC and HIV risk** (i) HIV risk factors • Belief that TMC protects against HIV transmission • Initiates engaged in unprotected sex with multiple sex partners

		of the Eastern Cape Province of South Africa.			
Peltzer, et al., 2009 [15]	Mpumalanga, South Africa	(i) Qualitative design (ii) Method: interview (iii) Aim: • to assess the current behavioural risk reduction messages and HIV/ AIDS education provided by medical and traditional providers of male circumcision • to assess the risk-related behavioural beliefs regarding circumcision, HIV/ AIDS risks, condoms, and gender attitudes among men who have undergone elective medical circumcision and men who have been circumcised in traditional initiation schools in the past 18 months.	(i) Number of participants • 30 men (ii) participant age • 18-30 years	Thematic analysis	**TMC, HIV risk, and impacts on men** **(i) TMC** • TMC as a cultural practice • Reasons to undergo TMC (ii) HIV risk • Belief that TMC reduces risk of contracting HIV • Initiates engaged in sex prior to incomplete wound healing • Initiated engaged in inconsistent condom use or unprotected sex with multiple partners (iii) impacts • TMC is associated with social status and being respect
Sarvestani, et al., 2012 [16]	Uganda	(i) Qualitative design (ii) Method: FGD (iii) Aim: • to characterize TMC practices in Uganda and the cultural implications	(i) Number of participants • 208 men (ii) participant age • 14-18 years	Thematic analysis	**TMC** (i) TMC • TMC as a cultural practice • The process of TMC

Shi, et al., 2019 [17]	Kenya, Lesotho, Malawi, Mozambique, Namibia, Rwanda, Tanzania, Uganda, Zambia and Zimbabwe	• (i) Quantitative design • Cross sectional study (iii) Aim: • to understand the sexual risk behavior of men with traditional male circumcision and medical male circumcision in the context of the World Health Organization's (WHO) campaign for voluntary medical male circumcision (VMMC) scale-up	(i) Number of participants • 43,222 males (ii) participant age • 15-49 years	Ordinal regression	**TMC and HIV risk** (i) HIV risk • Initiates engaged unprotected sex with multiple partners • Belief that TMC protects against HIV
Siweya, et al., 2018 [18]	Limpopo, South Africa	(i) Qualitative design (ii) Method: FGD (iii) Aim: • to determine the notions of manhood in TMC by African adolescent boys in Ngove Village, Limpopo Province	(i) Number of participants • 20 males (ii) participant age • 13-18 years	Thematic analysis	**TMC and HIV risk** (i) TMC • TMC as a cultural practice • The role of TMC in role modeling (ii) HIV risk • TMC promotes sex adventure for initiates

Appendix 1

Cochrane Database

ID	SEARCH	RESULT
#1	(Circumcision):ti,ab,kw	823
#2	(male circumcision):ti,ab,kw	644
#3	(Traditional circumcision):ti,ab,kw	28
#4	(traditional initiation):ti,ab,kw	530
#5	(traditional male initiation):ti,ab,kw	215
#6	(TMC):ti,ab,kw	153
#7	(traditional male circumcision):ti,ab,kw	22
#8	(indigenous male circumcision):ti,ab,kw	0
#9	(traditionally circumcised):ti,ab,kw	7
#10	(traditionally circumcised male):ti,ab,kw	7
#11	(open circumcision):ti,ab,kw	37
#12	(traditional men circumcision):ti,ab,kw	4
#13	(sifon):ti,ab,kw	1
#14	(traditionally circumcised men):ti,ab,kw	7
#15	(traditionally circumcised husband):ti,ab,kw	0
#16	(traditional practice of male circumcision):ti,ab,kw	4
#17	(practice of traditional men circumcision):ti,ab,kw	0
#18	(ritual traditional circumcision):ti,ab,kw	1
#19	(ritual initiation):ti,ab,kw	4
#20	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19	1,505
#21	(HIV infect*):ti,ab,kw	22,735
#22	(HIV prevention):ti,ab,kw	7,379
#23	(HIV control):ti,ab,kw	9,181
#24	(human immunodeficiency virus):ti,ab,kw	13,087
#25	(AIDS):ti,ab,kw	11,037
#26	(sexually transmitted infections):ti,ab,kw	1,782
#27	(risk of HIV infection):ti,ab,kw	4,161
#28	(HIV transmission):ti,ab,kw	2,970
#29	(sexually transmitted diseas*):ti,ab,kw	2,307
#30	#21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29	34,349
#31	(impact*):ti,ab,kw	140,990
#32	(psychological wellbeing):ti,ab,kw	7,265
#33	(distress):ti,ab,kw	24,913
#34	(economic impacts):ti,ab,kw	481

#35	(social effect):ti,ab,kw	18,607
#36	(stigma):ti,ab,kw	2,829
#37	(discrimination):ti,ab,kw	6,029
#38	(unproductive husband):ti,ab,kw	0
#39	(loss of job):ti,ab,kw	274
#40	(loss income):ti,ab,kw	717
#41	(health):ti,ab,kw	275,486
#42	(powerlessness):ti,ab,kw	55
#43	(worthlessness):ti,ab,kw	48
#44	(social distance):ti,ab,kw	1,128
#45	(social isolation):ti,ab,kw	1,536
#46	(stress):ti,ab,kw	69,129
#47	(mental health):ti,ab,kw	36,701
#48	#31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47	440,867
#49	(Developing countries):ti,ab,kw	4,556
#50	(less developed):ti,ab,kw	11,004
#51	(disadvantaged):ti,ab,kw	1,475
#52	(resource limited):ti,ab,kw	2,307
#53	(poor):ti,ab,kw	47,530
#54	(low*):ti,ab,kw	444,090
#55	(middle income*):ti,ab,kw	4,451
#56	(region*):ti,ab,kw	57,105
#57	(area*):ti,ab,kw	125,969
#58	(low resource regions):ti,ab,kw	86
#59	(resource limited regions):ti,ab,kw	62
#60	(resource limited countr*):ti,ab,kw	603
#61	(pacific countries):ti,ab,kw	206
#62	(developed countries):ti,ab,kw	3,507
#63	#49 OR #50 OR #51 OR #52 OR #53 OR #54 OR #55 OR #56 OR #57 OR #58 OR #59 OR #60 OR #61 OR #62	604,139
#64	**#20 AND #30 #48 AND #63**	**104**

Pubmed

ID	Search	Result
#1	Circumcision	9,524
#2	Male circumcision	7,140
#3	Traditional circumcision	724
#4	Traditional initiation	25,522

#5	Traditional male initiation	7,538
#6	TMC	18,118
#7	Traditional male circumcision	433
#8	Indigenous male circumcision	18
#9	Traditionally circumcised	104
#10	Traditionally circumcised male	85
#11	Open circumcision	189
#12	Traditional men circumcision	132
#13	Sifon	6
#14	Traditionally circumcised men	46
#15	Traditionally circumcised husband	3
#16	Traditional practice of male circumcision	231
#17	Practice of traditional men circumcision	89
#18	Ritual traditional circumcision	81
#19	Ritual initiation	376
#20	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19	53,328
#21	HIV infect*”	321, 398
#22	HIV prevention	110,968
#23	HIV control	118,789
#24	human immunodeficiency virus	414,981
#25	AIDS	295,363
#26	sexually transmitted infections	382,177
#27	risk of HIV infection	91,619
#28	HIV transmission	61,338
#29	sexually transmitted diseas*	47,282
#30	#21 OR #22 OR 23 #24 OR #25 OR #26 OR #27 OR #28 OR #29	606,521
#31	impact*	1,451,654
#32	psychological wellbeing	40,200
#33	distress	173,116
#34	economic impacts	134,222
#35	social effect	373,469
#36	stigma	35,752
#37	discrimination	328,352
#38	unproductive husband	3
#39	loss of job	3,248
#40	loss income	7,152
#41	health	5,932,617
#42	powerlessness	2,188
#43	worthlessness	907
#44	social distance	18,568

#45	social isolation	41,345
#46	stress	1,181,113
#47	mental health	471,114
#48	#31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47	8,094,384
#49	Developing countries	152,805
#50	less developed	397,001
#51	disadvantaged	115,498
#52	resource limited	112,693
#53	poor	753,973
#54	low*	2,817,510
#55	middle income*	78,651
#56	region*	2,238,390
#57	area*	1,819,969
#58	low resource regions	41,929
#59	resource limited regions	46,087
#60	resource limited countr*	17,754
#61	pacific countries	8,089
#62	developed countries	100,459
#63	#49 OR #50 OR #51 OR #52 OR #53 OR #54 OR #55 OR #56 OR #57 OR #58 OR #59 OR #60 OR #61 OR #62	7,164,066
#64	**#20 AND #30 AND #48 AND #63**	**1,091**

CINHAL (15/9/2022)

ID	Data search	Result
S1	Circumcision	2,744
S2	male circumcision	1,799
S3	traditional circumcision	69
S4	Traditional initiation	62
S5	Traditional male initiation	5
S6	TMC	279
S7	Traditional male circumcision	25
S8	Indigenous male circumcision	1
S9	Traditionally circumcised	15
S10	Traditionally circumcised male	3
S11	Open circumcision	2
S12	Traditional men circumcision	8
S13	Sifon	3
S14	Traditionally circumcised men	8

S15	Traditionally circumcised husband	28
S16	Traditional practice of male circumcision	4
S17	Practice of traditional men circumcision	863
S18	Ritual traditional circumcision	2
S19	Ritual initiation	14
S20	Circumcision OR male circumcision OR traditional circumcision OR traditional initiation OR traditional male initiation OR TMC OR traditional male circumcision OR indigenous male circumcision OR traditionally circumcised OR traditionally circumcised male OR open circumcision OR traditional men circumcision OR sifon OR traditionally circumcised men OR traditionally circumcised husband OR traditional practice of male circumcision OR practice of traditional men circumcision OR ritual traditional circumcision OR ritual initiation	3,085
S21	HIV infect*	90,037
S22	HIV prevention	26,675
S23	HIV control	24,023
S24	human immunodeficiency virus	126,951
S25	AIDS	72,540
S26	sexually transmitted infections	14,067
S27	risk of HIV infection	9,134
S28	HIV transmission	14,251
S29	sexually transmitted diseas*	17,446
S30	HIV infect* OR HIV prevention OR HIV control OR human immunodeficiency virus OR AIDS OR sexually transmitted infections OR risk of HIV infection OR HIV transmission OR sexually transmitted diseas*	175,524
S31	impact*	459,260
S32	psychological wellbeing	1,672
S33	distress	69,006
S34	economic impacts	6,098
S35	social effect	11,476
S36	stigma	28,392
S37	discrimination	39,690
S38	unproductive husband	1
S39	loss of job	1,187
S40	loss income	686
S41	Health impacts	44,686
S42	powerlessness	1,623
S43	worthlessness	228
S44	social distance	973
S45	social isolation	13,906
S46	stress	244,267

S47	mental health	180,215
S48	impact* OR psychological wellbeing OR distress OR economic impacts OR social effect OR stigma OR discrimination OR unproductive husband OR loss of job OR loss income OR health impacts OR powerlessness OR worthlessness OR social distance OR social isolation OR stress OR mental health	916,125
S49	Developing countries	32,517
S50	less developed	1,705
S51	disadvantaged	9,081
S52	resource limited	10,721
S53	poor	167,926
S54	low*	898,051
S55	middle income*	15,462
S56	region*	206,608
S57	area*	361,412
S58	low resource regions	39
S59	resource limited regions	119
S60	resource limited countr*	982
S61	pacific countries	580
S62	developed countries	13,338
S63	S49 OR S50 OR S51 OR S52 OR S53 OR S54 OR S55 OR S56 OR S57 OR S58 OR S59 OR S60 OR S61 OR S62	1,448,156
S64	(Circumcision OR “male circumcision” OR “traditional circumcision” OR “traditional initiation” OR “traditional male initiation” OR TMC OR “traditional male circumcision” OR “indigenous male circumcision” OR “traditionally circumcised” OR “traditionally circumcised male” OR “open circumcision” OR “traditional men circumcision” OR sifon OR “traditionally circumcised men” OR “traditionally circumcised husband” OR “traditional practice of male circumcision” OR “practice of traditional men circumcision” OR “ritual traditional circumcision” OR “ritual initiation”) AND (“HIV infect*” OR “HIV prevention” OR “HIV control” OR “human immunodeficiency virus” OR AIDS OR “sexually transmitted infections” OR “risk of HIV infection” OR “HIV transmission” OR “sexually transmitted diseas*”) AND (“impact*” OR “psychological wellbeing” OR distress OR “economic impacts” OR “social effect” OR stigma OR discrimination OR “unproductive husband” OR “loss of job” OR “loss income” OR “health impacts” OR powerlessness OR worthlessness OR “social distance” OR “social isolation” OR stress OR “mental health”) AND (“developing countries” OR “less developed” OR disadvantaged OR “resource limited” OR poor OR low* OR	50

	"middle income*" OR region* OR area* OR "low resource regions" OR "resource limited regions" OR "resource limited countr*" OR "developed countries" OR "pacific countries")	

Medline (15/09/22)

ID	Key Search	Result
S1	Circumcision	9,374
S2	male circumcision	6,065
S3	traditional circumcision	195
S4	Traditional initiation	165
S5	Traditional male initiation	12
S6	TMC	2,949
S7	Traditional male circumcision	61
S8	Indigenous male circumcision	2
S9	Traditionally circumcised	23
S10	Traditionally circumcised male	6
S11	Open circumcision	14
S12	Traditional men circumcision	12
S13	Sifon	5
S14	Traditionally circumcised men	13
S15	Traditionally circumcised husband	63
S16	Traditional practice of male circumcision	14
S17	Practice of traditional men circumcision	3,083
S18	Ritual traditional circumcision	8
S19	Ritual initiation	43
S20	Circumcision OR male circumcision OR traditional circumcision OR traditional initiation OR traditional male initiation OR TMC OR traditional male circumcision OR indigenous male circumcision OR traditionally circumcised OR traditionally circumcised male OR open circumcision OR traditional men circumcision OR sifon OR traditionally circumcised men OR traditionally circumcised husband OR traditional practice of male circumcision OR practice of traditional men circumcision OR ritual traditional circumcision OR ritual initiation	12,495
S21	HIV infect*	270,768
S22	HIV prevention	30,071
S23	HIV control	15,837
S24	human immunodeficiency virus	113,022
S25	AIDS	299,295

S26	sexually transmitted infections	36,312
S27	risk of HIV infection	14,681
S28	HIV transmission	22,859
S29	sexually transmitted diseas*	45,085
S30	HIV infect* OR HIV prevention OR HIV control OR human immunodeficiency virus OR AIDS OR sexually transmitted infections OR risk of HIV infection OR HIV transmission OR sexually transmitted diseas*	509,496
S31	impact*	1,446,702
S32	psychological wellbeing	2,963
S33	distress	162,321
S34	economic impacts	22,060
S35	social effect	27,700
S36	stigma	36,196
S37	discrimination	168,953
S38	unproductive husband	3
S39	loss of job	2,135
S40	loss income	1,788
S41	Health impacts	107,509
S42	powerlessness	1,391
S43	worthlessness	456
S44	social distance	4,093
S45	social isolation	24,605
S46	stress	1,141,833
S47	mental health	396,591
S48	impact* OR psychological wellbeing OR distress OR economic impacts OR social effect OR stigma OR discrimination OR unproductive husband OR loss of job OR loss income OR health impacts OR powerlessness OR worthlessness OR social distance OR social isolation OR stress OR mental health	3,099,234
S49	Developing countries	146,228
S50	less developed	10,682
S51	disadvantaged	16,667
S52	resource limited	34,488
S53	poor	699,351
S54	low*	4,964,973
S55	middle income*	35,250
S56	region*	2,226,728
S57	area*	1,811,466
S58	low resource regions	164
S59	resource limited regions	561
S60	resource limited countr*	3,538

S61	pacific countries	1,961
S62	developed countries	67,110
S63	developing countries OR less developed OR disadvantaged OR resource limited OR poor OR low* OR middle income* OR region* OR area* OR low resource regions OR resource limited regions OR resource limited countr* OR developed countries OR pacific countries	8,482,340
S64	(Circumcision OR male circumcision OR traditional circumcision OR traditional initiation OR traditional male initiation OR TMC OR traditional male circumcision OR indigenous male circumcision OR traditionally circumcised OR traditionally circumcised male OR open circumcision OR traditional men circumcision OR sifon OR traditionally circumcised men OR traditionally circumcised husband OR traditional practice of male circumcision OR practice of traditional men circumcision OR ritual traditional circumcision OR ritual initiation) AND (HIV infect* OR HIV prevention OR HIV control OR human immunodeficiency virus OR AIDS OR sexually transmitted infections OR risk of HIV infection OR HIV transmission OR sexually transmitted diseas*) AND (impact* OR psychological wellbeing OR distress OR economic impacts OR social effect OR stigma OR discrimination OR unproductive husband OR loss of job OR loss income OR health impacts OR powerlessness OR worthlessness OR social distance OR social isolation OR stress OR mental health) AND (developing countries OR less developed OR disadvantaged OR resource limited OR poor OR low* OR middle income* OR region* OR area* OR low resource regions OR resource limited regions OR resource limited countr* OR developed countries OR pacific countries)	206

Scopus (13/9/2022)

(TITLE-ABS-KEY (circumcision OR "male circumcision" OR "traditional circumcision" OR "traditional initiation" OR "traditional male initiation" OR tmc OR "traditional male circumcision" OR "indigenous male circumcision" OR "traditionally circumcised" OR "traditionally circumcised male" OR "open circumcision" OR "traditional men circumcision" OR sifon OR "traditionally circumcised men" OR "traditionally circumcised husband" OR "traditional practice of male circumcision" OR "practice of traditional men circumcision" OR "ritual traditional circumcision" OR "ritual initiation")) AND (TITLE-ABS-KEY ("HIV infect*" OR "HIV prevention" OR "HIV control" OR "human immunodeficiency virus" OR aids OR "sexually transmitted infections" OR "risk of HIV infection" OR "HIV transmission" OR "sexually transmitted diseas*")) AND (TITLE-ABS-KEY ("impact*" OR "psychological

wellbeing" OR distress OR "economic impacts" OR "social effect" OR stigma OR discrimination OR "unproductive husband" OR "loss of job" OR "loss income" OR "health impacts" OR powerlessness OR worthlessness OR "social distance" OR "social isolation" OR stress OR "mental health")) AND (TITLE-ABS-KEY ("developing countries" OR "less developed" OR disadvantaged OR "resource limited" OR poor OR low* OR "middle income*" OR region* OR area* OR "low resource regions" OR "resource limited regions" OR "resource limited countr*" OR "developed countries" OR "pacific countries"))

Result: 245

Proquest (15/09/2022)

noft(Circumcision OR “male circumcision” OR “traditional circumcision” OR “traditional initiation” OR “traditional male initiation” OR TMC OR “traditional male circumcision” OR “indigenous male circumcision” OR “traditionally circumcised” OR “traditionally circumcised male” OR “open circumcision” OR “traditional men circumcision” OR sifon OR “traditionally circumcised men” OR “traditionally circumcised husband” OR “traditional practice of male circumcision” OR “practice of traditional men circumcision” OR “ritual traditional circumcision” OR “ritual initiation”) AND (“HIV infect*” OR “HIV prevention” OR “HIV control” OR “human immunodeficiency virus” OR AIDS OR “sexually transmitted infections” OR “risk of HIV infection” OR “HIV transmission” OR “sexually transmitted diseas*”) AND (“impact*” OR “psychological wellbeing” OR distress OR “economic impacts” OR “social effect” OR stigma OR discrimination OR “unproductive husband” OR “loss of job” OR “loss income” OR “health impacts” OR powerlessness OR worthlessness OR “social distance” OR “social isolation” OR stress OR “mental health”) AND (“developing countries” OR “less developed” OR disadvantaged OR “resource limited” OR poor OR low* OR “middle income*” OR region* OR area* OR “low resource regions” OR “resource limited regions” OR “resource limited countr*” OR “developed countries” OR “pacific countries”)

Result: 1345

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	2
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	3
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	3
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	4-5
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	4
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	3-4
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	5-6
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	7
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	4-5
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	N/A
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	N/A
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	5

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	N/A
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	N/A
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	5-6 & Fig. 1
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	7 & Table 3
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	N/A
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	7-14
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	N/A
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	N/A
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	N/A
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	14-16
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	17
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	17
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	N/A

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

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Traditional male circumcision and the risk for HIV transmission among men: a systematic review

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Keywords:	Systematic Review, INFECTIOUS DISEASES, HIV & AIDS < INFECTIOUS DISEASES, PUBLIC HEALTH, QUALITATIVE RESEARCH

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Traditional male circumcision and the risk for HIV transmission among men: a systematic review

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ABSTRACT

Objectives to synthesise evidence in order to determine whether, in contrast to medical male circumcision, traditional male circumcision (TMC) practices may contribute to HIV transmission and what the impacts of TMC are on the initiates, their families and societies.

Design Systematic review.

Data Source PubMed, CINHAL, SCOPUS, ProQuest, Cochrane database, and Medline were searched between 15 – 30 October 2022.

Eligibility criteria (i) included young men, young male adults, male adults, mixed participants males and females; (ii) studied on TMC involving men living with HIV (married and non-married); (iii) studied on TMC, HIV transmission and impact in Low Middle Income Countries (LMICs); (iv) qualitative, quantitative and mixed method studies, and (v) aimed at exploring TMC and how it contributes to HIV transmission and the impacts of HIV on circumcised men and their families.

Data extraction Data were extracted based on study details, study design, characteristic of participants, and results.

Result A total of 18 studies were included: 11 were qualitative studies, 5 were quantitative studies, and 2 were mixed-method studies. All the studies included were conducted in areas where TMC was performed (17 in Africa and 1 in Papua New Guinea/PNG). The findings of the review were categorized into themes namely TMC as a cultural practice, consequences of not being traditionally circumcised on men and their families, and TMC-related risk of HIV transmission.

Conclusion This systematic review highlights that TMC practice and HIV risk could bring negative challenges for men and their families. It seems that little attention has been paid to men and their families experiencing the impacts of TMC and HIV risk factors. The findings recommend the need for health intervention programs such as safe circumcision and safe sexual behaviors following TMC, and efforts to address psychological and social challenges in communities practicing TMC.

Prospero Number Registration: CRD42022357788.

Strengths and limitations of this study

- This is the first systematic review on TMC and the risk for HIV transmission on the males
- This systematic review was based on the systematic literature search in accordance with Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA)
- The scientific quality of each included study was appraised using critical appraisal tools
- A large number of synonyms of TMC were included
- The literature review included articles published in English only

I. Introduction

Circumcision is a cultural practice older than written history can explain, can be traced back to pre-Abrahamic times, and can be found in many Judeo-Christian traditions in Africa [1, 2]. It may be also one of the oldest human surgical procedures in the world [3]. It is a practice that has been widely performed on boys and young men by cutting off the foreskin of the penis as a rite of passage to mark the transition from childhood to manhood, primarily for religious and cultural reasons/beliefs [4, 5]. In many parts of the world, it has traditionally been practiced in Africa, Asia, Australia, Polynesia, and South and North America [3]. From the late 19th century onwards, circumcision is not only seen as a cultural or religious practice/identity, but also a public health approach [6]. In the 1980s, observational studies came up with the hypothesis that circumcision might protect against human immunodeficiency virus (HIV) transmission [7, 8].

Male circumcision provides significant protection against HIV transmission and other sexually transmitted infections (STIs) in men [9-15]. This has been proven by randomised controlled trials in South Africa, Kenya, and Uganda [13, 16, 17], showing that circumcised males were less likely to become infected with HIV. As a result, male circumcision is increasingly recommended as a strategy to reduce HIV transmission, particularly in areas of a high prevalence of HIV [18-27]. A report from the World Health Organization and the United Nations has also highlighted a correlation between the lack of male circumcision and higher HIV rates, specifically in Eastern and Southern Africa [28]. Likewise, some meta-analysis showed that male circumcision affords significant protection against HIV infection [29-31]. However, skepticism has also been raised regarding the protective effect of male circumcision on HIV transmission: some previous studies failed to prove the correlation between male circumcision and HIV infection prevention [32, 33], while another study falsely claimed that circumcision increased the risk of HIV transmission [34]. This false claim was strongly criticized as the study used simple data pooling that can lead to incorrect results [35-37]. Such skepticism seems also to be supported by some evidence from Japan and Scandinavian countries showing that the percentage of circumcised men is low, but the prevalence of HIV cases in these counties is also low [38]. However, when it comes to male circumcision and HIV infection in socioeconomically advanced countries, such as Scandinavian countries, as well as others in Europe, the UK, North America, and Australia male circumcision is protective once sexual practice and sexual activity is taken into account, namely receptive anal intercourse by men who have sex with men (MSM) [39]. This is the major source of HIV infection in such countries and obviously male circumcision would have no biological capacity to protect against transmission [39]. Furthermore, factors such as sexually active behaviors prior to

circumcision, religion [40], history of STIs, and age [7] have been reported to be overlooked in the findings of randomised trials. These factors have also been as supporting reasons for doubt about the strength of the relationship between male circumcision and HIV transmission prevention.

Similar to medical circumcision, the protective benefits of traditional male circumcision (TMC) have been a common question. Some evidence has suggested that TMC provides less or no protection from HIV transmission due to less amount of foreskin removed [41-43]. Newly traditionally circumcised males are also considered to have minimal protection if they have sexual intercourse before the wound heals completely [13, 44]. The possibility of acquiring HIV infection through TMC is also considered high due to sharing of a surgical knife or blade on multiple men [23, 45-48]. TMC refers to the procedure of removing the foreskin on males in a non-clinical way by traditional circumcisers without formal medical training [49]. In addition to preparing newly circumcised males for the transition to manhood, TMC symbolises new initiates officially being accepted in the community with a new status of being a man and becoming a good model in family and society [50-52]. TMC also denotes that new initiates have a greater social responsibility to their families and community, act as negotiators in community disputes, and have a chance to learn about the community's problems [18, 19]. These symbolisations highlight TMC as a sacred and secret rite. For example, in Africa, initiates are forbidden to talk with outsiders about the circumcision ritual and those who undergo the ritual as it will cause severe punishment imposed by the community [53, 54]. Similarly, sanctions will be imposed on females and non-circumcised males who gain information about the ritual [55]. To some extent, due to its sacredness, the further consequences of TMC practice have become a challenge for health intervention programs.

Studies on male circumcision and the risk for HIV transmission have been conducted in many parts of the world including low- and middle-income countries (LMICs) and developed countries. The American Academy of Pediatrics and US CDC have suggested that the health benefits of male circumcision outweigh the risk [56, 57], and that they support parents approved infant male circumcision [56] and recommend male circumcision at any age for the health reason . Although TMC is still practiced in a number of countries, and its healing process may have a high risk of HIV and other STIs transmission, to the authors' knowledge, there have been no published systematic reviews on TMC, HIV risk, and impacts on circumcised men and their families. Thus, the authors consider it important to conduct a systematic review to synthesise evidence in order to determine whether, in contrast to medical male circumcision, TMC practices may contribute to HIV transmission and what the impacts of TMC are on the initiates, their families and societies. To determine whether a previous systematic review exploring this theme had been completed or is in progress, we conducted a preliminary search in PubMed, CINHAL, and Scopus and found no underway systematic review on this topic in LMICs and developed countries. We also registered the systematic review to International Register of Systematic Reviews (PROSPERO) to reduce bias and avoid unintended duplication of reviews. Therefore, this systematic review is needed to fill the gap and to help inform future health efforts at all levels including health practitioners, researchers, and policy makers.

2. Methods

2.1 The Systematic Search Strategy

The protocol for the systematic review has been registered with PROSPERO (registration ID: CRD42022357788) [58] . The systematic search started with an initial search following the PICO (Population, Intervention, Comparison and Outcomes) framework, which has been used as part of the WHO guidelines development process to inform evidence-based practice. The systematic search was developed in collaboration with a health librarian expert, and the search terms were adjusted by each database. Databases searched included PubMed, CINHAL, SCOPUS, ProQuest Public Health, Cochrane Library, and Medline Complete - EBSCO. The search was limited to the English language, and with no year limit in order to capture as many articles as possible about circumcision, traditional male circumcision, HIV, and impact on men and their families. The search strategies for the databases are in appendix 1. Medical Subject Headings (MeSH) were used as part of the search strategies. The search terms were formulated using the combination of key terms or the synonym of each concept using boolean terms (OR, AND). In addition to electronic search, Google Scholar, and google were used to search grey literature using key terms, such as traditional male circumcision OR traditional circumcision. Reference lists of all relevant articles were also scrutinised to identify articles that were not recaptured by electronic database search. The search for databases was conducted 15 – 30 October 2022. The combination of key terms for electronic database search, including the synonym of each concept is in table 1.

Table 1. Search terms

Concept and search items
#1. Circumcision OR male circumcision OR traditional circumcision OR traditional initiation OR traditional male initiation OR TMC OR traditional male circumcision OR indigenous male circumcision OR traditionally circumcised OR traditionally circumcised male OR open circumcision OR traditional men circumcision OR sifon OR traditionally circumcised men OR traditionally circumcised husband OR traditional practice of male circumcision OR practice of traditional men circumcision OR ritual traditional circumcision OR ritual initiation
#2. HIV infect* OR HIV prevention OR HIV control OR human immunodeficiency virus OR AIDS OR sexually transmitted infections OR risk of HIV infection OR HIV transmission OR sexually transmitted diseas*
#3. impact* OR psychological wellbeing OR distress OR economic impacts OR social effect OR stigma OR discrimination OR unproductive husband OR loss of job OR loss income OR health impacts OR powerlessness OR worthlessness OR social distance OR social isolation OR stress OR mental health
#4. developing countries OR less developed OR disadvantaged OR resource limited OR poor OR low* OR middle income* OR region* OR area* OR low resource regions OR resource limited regions OR resource limited countr* OR developed countries OR pacific countries

Search combination #1 AND #2 AND #3 AND #4
The search will be applied in different databases: PubMed, CINHAL, SCOPUS, ProQuest, Cochrane database, and Medline.

2.2 Inclusion and Exclusion Criteria

The review included qualitative, quantitative, and mixed method studies and evidence syntheses (systematic reviews). A summary of inclusion and exclusion criteria is shown in table 2.

Table 2. Inclusion and exclusion criteria

PICO acronym	Inclusion criteria	Exclusion criteria
P-Population	Young men, young male adults, male adults, mixed participants males and females Studies on TMC involving men living with HIV (married and non-married) Mixed gender (male and female) but with explicit evidence on male	Infant, children, women, female
I- phenomenon of Interest	TMC, HIV transmission and impact	Medical circumcision and its impact and voluntarily medical male circumcision (VMMC)
Co-Context	LMICs and developed countries	
S-Study design	Qualitative, quantitative and mixed method studies. Literature reviews, reports, policy documents, ethnography, anthropology and social study	
Language	English	Other than English

Purpose of study	Studies aiming at exploring the TMC and how it contributes to HIV transmission and the impacts of HIV on circumcised men and their families	Studies aiming at exploring HIV risk factors and impacts on women
Text	Full text available	Only abstract
Year publication	No year limit	

2.3 Data Screening

All the identified articles (Fig. 1) were collated and imported into EndNote X9 (Clarivate Analytics, PA, USA). The search identified a total of 3,041 articles from databases and 8 articles from other sources. Duplicates (n=690) were removed using EndNote. The titles and abstracts of the remaining 2,359 articles were screened the first author, further removing a total of 2,118 articles due to irrelevant populations and focus or aims. In total, 241 articles were examined in full text for eligibility by the first and second authors and disagreements were resolved through discussion among the three authors. Of this, 222 articles were excluded due to not meeting inclusion criteria. Nineteen articles fulfilling inclusion criteria were then assessed for methodological quality using critical appraisal tools developed by the Joanna Briggs Institute (JBI) for study design [59]. This led to the exclusion one article not meeting the methodological quality and the remaining 18 articles were included in the final review. The methodological quality assessment was performed by the authors GAA and NKF. Uncertainty was resolved through discussion among the three authors. The screening process of the articles is reported and presented according to the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) flow diagram (Figure 1) [60].

2.4 Data Extraction and Data Analysis

For each included article, data extraction was conducted with an extraction sheet. In the sheet, we recorded (i) study details: the last name of the first author, year of publication, study setting; (ii) study design: type of study, study aim, analysis methods; (iii) characteristics of participants: population, sex of participants, age of respondents; and (iv) results: the main themes, including TMC as a cultural practice, the impact of not being traditionally circumcised and the risk for HIV transmission (Supplementary File 1). The analysis followed three-stage procedures by Thomas and Harden framework [61]: (i) coding the text line by line, interpreting the data, and identifying concepts or themes; (ii) developing descriptive themes by groping similar concepts in theme and sub-theme; and (iii) generating analytical themes by reviewing preliminary themes and discuss the addition or revision of the themes. The final analytical themes were then reviewed and decided as presented below.

2.5

In general, the quality of methodological assessment of the included studies varied. Among the 18 studies, 5 studies reached 100% of assessment of methodological quality, 8 studies reached 90%, 4 studies reached 80%, and 1 study reached 70%. The detail of the assessment of methodological quality can be seen in Supplementary File 2.

2.5 Patient and public involvement

This study used published studies and did not include patients and public involvement.

3. Result

3.1 Characteristic of Included Studies

All included articles were published in English and were published from 2003 to 2020. Among the 18 included publications, 11 were qualitative studies [44, 62-71], 5 were quantitative studies [72-76] and 2 were mixed methods [77, 78]. All the studies included were conducted in areas where traditional male circumcision was performed. A total of 48,468 participants were involved in the review, of whom 1055 and 47,413, respectively, were involved in qualitative and quantitative studies. 11 studies involved male only [65-70, 73-75, 77, 79], 7 studies involved men and women [44, 62-64, 72, 76, 78], 2 studies involved traditional circumcisers [64, 65], and 1 study involved health practitioners [64]. Participants' ages ranged from 13 to 70 years old. Among the 18 studies, 2 studies did not report the participants' age [62, 66]. Most of the studies (n=17) were conducted in Africa while 1 study was conducted in PNG [62].

Key findings were grouped into three main themes, including (i) TMC as a cultural practice, (ii) TMC and challenges of not being traditionally circumcised on men and family, and (iii) TMC and the risk for HIV transmission. Finally, knowledge gaps were identified.

3.2 TMC As a Cultural Practice

It is widely recognized that TMC is practiced by various cultural groups among men as a rite of passage from childhood to adulthood. To the search, TMC is mostly practiced in LMICs in Africa and in PNG. Thirteen studies [44, 62, 63, 65, 66, 68-71, 76-78, 80] discussed TMC as a cultural practice: process of TMC, TMC as a secret and sacred practice, and reasons to undergo TMC.

3.2.1 Process of TMC

Of the fourteen studies, seven studies [62, 63, 65, 66, 69, 70, 78] described three steps of TMC ceremony, including separation from family and community, transition, and incorporation into the family and community. In separation step, new initiates were taken to a mountain or camp for weeks or months [66, 78]. This long period was reported adequate time for healing process and learning about manhood [66]. The separation was meant for new initiates to demonstrate survival skills, such as ability to endure the pain which could improve men's quality such as strength, courage, respect and fortitude [63].

Transition process is a step where initiates were taught about the social norms, cultural knowledge and community expectation for them so that they could socialize with their nuclear family, friends, and community [70]. For example, a study in Papua New Guinea [62] found that new initiates were taught about what they have as a clan, such as their ancestral values and spirit, their clan's history, status, the land, the forest and the sea. Three studies [66, 69, 78] discussed about expectations in initiate's families and communities after being traditionally circumcised which is in line with a study [81] reporting new initiates were expected to be a role model, have the ability to protect family, solve family disputes, and refuse tasks considered as a female domain. In the community, they were also expected to have sense of belonging to the community, take greater responsibilities (avoiding criminal activities and abuse of women), be able to cooperate with elders, and have the ability to face difficulties in the future.

In addition to learning about family and community, several studies [70, 78] reported that new initiates were taught about sexuality during TMC ceremony. A study in Limpopo, South Africa [63] found that sexual socialization during TMC puts an emphasis on sexual control and sexual reserve rather than "permit to sex." For example, initiates were taught that if they did not wait long time to have sexual intercourse after being circumcised, their foreskin will grow again, and therefore, they have to undergo a new circumcision which is more painful [70]. However, other findings [70, 78] discovered that the emphasis of sexuality during circumcision has been changed with circumcision as a "license" for sex including unsafe sex behaviors. These studies support the findings of another study reporting that traditionally circumcised men tended to assume that they had unlimited and unquestionable rights to have access to sex [81].

Incorporation process was marked by the return of initiates to the family and community. In South Africa [70], upon returning new initiates wore a new dress code symbolizing new circumcised men reentering family and community as a new individual or a transformed individual who were ready to fulfill new roles in their society. This process is marked with a celebration by slaughtering animals (a goat or a sheep) as a sign of thanks to ancestors, family and community [66]. A study in Papua New Guinea found that incorporation was marked with having a celebration or party with family and community [62]. Celebration of successful traditional circumcision draw symbolic power of being custodians of cultural practices resulting in a sense of community, social identity, and belonging [65].

Three studies [45, 65, 73] described TMC as an incomplete or partial circumcision as only part of the foreskin was removed during circumcision. This is usually performed in non-clinical settings by traditional circumcisers without formal medical training. Having partial foreskin is considered the same as not being circumcised as the foreskin keeps semen in the penis, thus, making them "dirty" and vulnerable to easily being infected with HIV and other STIs infections compared to full circumcision (medical circumcision) [65]. Findings showed that TMC, similar to medical circumcision, may reduce the risk of HIV and other STIs. The findings also showed that the amount of foreskin removed during the ceremony determines the extent of effectiveness against HIV transmission.

3.2.2 TMC As a Secret and Sacred Practice

Six studies [62, 63, 65, 66, 70, 76] described TMC as a sacred, secret, and compulsory cultural practice in communities. As a sacred and secret practice, TMC was conducted with certain rituals in certain places and performed my certain people (traditional circumcisers). In Tanzania, the traditional circumcisers were appointed by ancestors through dreams, and the skills were passed from one person to another through observation [65]. Meanwhile, in Xhosa, South Africa, the skills were taught by elder circumcisers through apprenticeship [66]. Ritual ceremony was performed by traditional circumcisers or clan leaders prior to circumcision. Similarly, as a compulsory practice, all men within community were required to undergo such practice. Secretness is also marked by separation or isolation. Studies in Africa found that secretness is marked by isolating or separating new initiates from their families and communities [66, 70]. Similarly, a study in Papua New Guinea [62] found that TMC was performed in a designated home for exclusive use of men where only men were allowed to witness the actual process.

The cultural practice of TMC in Africa and Asia does not allow women to be around the ceremony and view or have knowledge of the process of TMC. It is believed initiates will be affected by witchcraft and experience slow recovery process if women were present during the ceremony. However, women in Papua New Guinea [62] were found highly knowledgeable about the whole process of TMC, able to explain in detail the cutting process, the procedures and the disposal of blood. The role of women in the community in Papua New Guinea was to start preparing for welcoming new initiates such as making food, buying pigs to be eaten during celebration, singing, dancing and giving gifts.

The sacredness of the TMC was reported to be related with the initiate's ancestors intervention as highlighted in two studies [65, 66]. In South Africa, ancestors were reported to be involved in TMC process and wound healing following circumcision. Long healing wounds or not healing properly is associated with sexual impurity. For example, in Monduli, Tanzania [76], it was believed that the wound took two weeks to be completely healed for initiates who had not engaged in sexual intercourse prior to circumcision, and took more than one month for the exposed ones. Due to this, in certain communities, initiates were asked to repent their sins so that the wound heals quickly [66].

3.2.3 Reasons to Undergo TMC

Ten studies [44, 62, 65, 66, 68-71, 76, 77] describe rationales for TMC. These studies underlined an obligation for performing cultural rites to prepare new initiates for the responsibility of adulthood as the main reason for TMC. A qualitative study in South Africa [44] found that men and women underlined the importance of TMC to live up to cultural values and community expectations. They believed that traditionally circumcised men were more mature, less abusive, and more responsible, compared to non-traditional circumcision as they had received teachings during ceremonies. Furthermore, learning social norms, cultural values and men's related values such as being tough and brave to take risk were aspects that were only found in traditional circumcision and not in medical circumcision [82]. This reason seemed to significantly influence

initiates' resistance to the modern medical circumcision. Expecting the privilege of being accepted and being together, such as having meals in the same dishes with the circumcised ones, was also a supporting factor for men to undergo TMC [77].

Four studies [76, 80, 83, 84] described economic reasons to undergo TMC. Low cost for TMC compared to medical circumcision was reported to affect initiate's and their family's decision [83]. Evidence from South Africa showed that new initiates could not afford to pay medical circumcision and the amount of money charged by legal traditional circumcisers resulting in new initiates taking health risks by visiting illegal traditional circumcisers because they charge less [77]. Such evidence seemed to show that people who were economically vulnerable in traditional settings may only be able to access cheaper circumcision services with high risk of complication and potential risk of HIV transmission. Nevertheless, in many cases, the cost charged for traditional circumcision did not include the time the wound was fully recovered, complication requiring further medical treatment, and celebration of fully recovery [80].

Five studies [44, 62, 65, 69, 71] discussed the influence of women (e.g., girlfriends, future wives/partners), family, community and peers on men to undergo circumcision (TMC and medical circumcision). Evidence from South Africa showed that women often scheduled the appointment for their boyfriend or and husband to be traditionally circumcised [79]. Similarly, another finding in South Africa showed that women tended to undermine the manhood of non-circumcised males [69]. Also, a finding in PNG showed that women prefer circumcised men for marriage and as a sexual partner [62]. In addition to cultural reasons, women's preferences for circumcised men were related to pleasure and satisfaction during sexual intercourse compared to uncircumcised men [44]. This is in line with other systematic reviews reporting that women would prefer circumcised men for multiple reasons including sexual pleasure [85, 86]. Family, community and peers were also reported as significant influences for young men to undergo TMC [65].

3.3 TMC and The Consequences of Not Being Traditionally Circumcised on Men and Their Families

Eleven studies [44, 62-65, 67, 68, 70, 72, 76, 87] described the challenges of not being traditionally circumcised, including psychological impacts and social challenges. The details about these aspects are presented below.

3.3.1 Psychological Challenges

Psychological impacts including feelings of shame, stress, and embarrassment were common negative challenges experienced by men who were not traditionally circumcised [88]. Such challenges were supported by experiences of being asked by friends about when to undergo TMC [88]. Another stressor for such psychological challenges included feeling obligated to undergo the ritual. Similarly, uncircumcised men were negatively affected by community perception on masculinity and adulthood.

Social pressures associated with traditional circumcision was another stressor for psychological challenges facing young people in some settings. Several studies described adolescents and young men in Africa who experienced social pressure from their family and peers for being medically circumcised and uncircumcised [44, 65]. For example, a number of men acknowledged that they decided to be traditionally circumcised because their fathers or brothers had undergone circumcision, leading them to feel obligated to undergo the same ritual [70]. Others pointed to the respect to culture or system they grew up with where all men underwent the same ritual [70]. In Xhosa community, South Africa, it was often uncircumcised men were called cowards by friends at the same age [70]. Therefore, the decision to be traditionally circumcised was to avoid being harassed and ridiculed. In the family context, pressure of young men to be traditionally circumcised stems from the desire to maintain the family honor [67].

Another significant pressure was from women. Studies found that boys felt pressure when asked by girl friends or partners about their circumcision status. A study in South Africa found that girls were undermined if dating and walking with uncircumcised boys [70]. Uncircumcised boys were also considered as not ready for building a relationship with women [67]. Another finding in Africa also showed that circumcision is beneficial for women who were married to men who were cheating as circumcision might protect against HIV transmission [70].

3.3.2 Social Challenges: Stigma, Discrimination and Disrespect

Seven studies [44, 62, 63, 67, 69, 70, 87] described stigma and discrimination related to TMC. A study in Xhosa, South Africa noted that 70% of Xhosa initiates felt that they would experience stigmatization if they were not traditionally circumcised [89]. In the same study setting, uncircumcised men and those who underwent medical circumcision were stigmatized as boys who were immature and impossible to distinguish them from 'real men' [67]. Similarly, uncircumcised men in PNG [62] felt ridiculed, mocked and people made fun of those who were not traditionally circumcised. Indeed, uncircumcised men in PNG are referred to as *utilusa* (foreskin) instead of using their actual name. Such impact was not only experienced by the initiates but also the initiate's families in which the initiates' father and family were looked down by others within the community. For young uncircumcised men in Africa, stigma, discrimination, and rejection were reported to have caused long-term psychological effects reflected in anxiety, personality change and lack of confidence [67].

It is also reported that uncircumcised men were treated differently and assumed negatively as reported in two studies [67, 70]. In the family and community, they were highly vulnerable, often blamed for any inappropriate actions and considered incapable of moral worth. For example, uncircumcised men are often accused of being liars and thieves and were also treated like animal (a dog) in their community [67]. Another study in Africa showed that uncircumcised men and those who underwent medical circumcision would not be accepted in the community, not obtain rights and responsibility in their family, and had no rights to negotiate with elders [70]. Also, they were not allowed to start families within their community and are not allowed to inherit and have property on their own [67]. Such negative impacts were reported to affect uncircumcised

men psychologically, such as feeling embarrassed, disadvantaged and having low/no moral worth.

A couple of studies also suggested that men who were uncircumcised and underwent medical circumcision did not earn respect from community [44, 70]. In some settings it is considered proper for the community not to respect men who failed to follow the rite of passage and this leads them to not receive the same status as other men [44, 70]. Uncircumcised men and those who failed to follow the ritual would be marginalized from traditional ceremony and community discussion [67]. These studies suggested that such consequences can lead to further psychological problems such as feeling sad, low self-esteem, feeling guilt, social withdrawal and frustration among traditionally uncircumcised men.

The social challenges, stigma, discrimination and expectation towards traditionally circumcised men underline cultural constructions of the penis and body which then leads to construction of masculinity and womanhood, which further raises issues of gender constructions [90]. The body functions metaphorically to symbolize social status, tribal affiliation, family position, and gender [90]. Rite of passage indicated by ritual and social transformation plays significant roles in social interaction within community [90].

3.4 TMC and the Risk for HIV Transmission

Nine studies [44, 63-65, 72, 73, 75, 76, 78] described (i) shared knife and bandage, unhygienic environment and the risk for HIV transmission; (ii) TMC promoted multiple sexual intercourse and increase sex partners, (iii) Belief in the protective effects of TMC against HIV/AIDS, and (iv) TMC and knowledge of HIV transmission.

3.4.1 Shared a Knife and Bandage, Unhygienic Environment and the Risk for HIV Transmission

Four studies [64, 65, 72, 76] highlighted the practice of one knife or blade used to circumcise several initiates. For example, the majority of participants in a study in Tanzania reported that one knife was used in all TMC ceremony [65]. Similarly, a quantitative study in South Africa showed that using one knife or blade to circumcise several initiates in one or several TMC ceremonies were reported to put initiates at high risk of being infected with HIV and other STIs as some of the initiates may have had unsafe sexual intercourse prior to circumcision and may already be HIV-positive [72]. However, another finding in a quantitative study [76] showed that some traditional circumcisers started using one knife or razor one for one initiate.

A study by Mpateni and Kang'ethe [64] also highlight the possibility of being infected with HIV and other infectious diseases through sharing bandage and unhygienic environment reflected in unclean areas around the ceremony and using unwashed dishes to eat. Such poor environment was supported by careless mistakes of traditional circumcisers who lack of knowledge of the importance of hygiene and the way the infectious diseases spread.

3.4.2 TMC Promotes Multiple Sexual Intercourses and Increases Sex Partners

Promoting multiple sexual intercourse in TMC was reported in five studies [44, 63, 64, 75, 78]. A qualitative study in Malawi [78] found stakeholders' concern on the role of TMC ceremony promoting sexual adventure among new initiates, asserting that circumcised men were not children anymore after they had sexual intercourse following circumcision. Similarly, there was also myths and false teaching that after being traditionally circumcised, initiates had to have sex with several females for testing of the penis [64]. As a result, many boys took this ceremony as a license to start having sex. This finding supports the finding of a study [63] that traditional initiation school had a strong influence on initiates sexual behaviors. This high sexual desire was reported to be supported by considerable amount of time they spent in the bush or camp during TMC ceremony without any contact with female [44]. Elsewhere, a qualitative study [44] found that traditionally circumcised men were told to have sexual intercourse without condoms to prove that they could enjoy flesh-to-flesh sex following the circumcision. As a result, some initiates continued to not using condoms following TMC.

Promoting sexual intercourse has led traditional initiates to increase the number of sex partners as reported in two quantitative studies [73, 75]. The study in Kenya found some initiates had more sexual desire following TMC, resulting in initiates increased their number of sexual partners. Such practice was reported to increase the transmission of STIs [75]. The study suggests the need of the synergy between traditional ritual and medical intervention for HIV preventive practice.

3.4.3 Belief in the Protective Effects of TMC Against HIV and Condom Use

Belief in the protective effects of TMC against HIV/AIDS transmission was also a risk factor which further affects initiates' sexual behaviors. Four studies [70, 74, 75, 91] discussed about beliefs in the protective effects of TMC. Traditionally circumcised men tended to believe that TMC offers complete protection against HIV and other STIs and that circumcision is an alternative of condom use [91]. A quantitative study in Eastern Cape, South Africa found that 97% of TMC initiates believed that TMC made initiates become a 'real man', and that they did not need to use condoms during sexual intercourse [75]. A study in Sub-Saharan African countries [73] found that traditionally circumcised males were less likely to use condoms following circumcision. This is similar with the findings from Eastern Cape [74], reporting TMM initiates were more likely to engage in risky sexual activities. Similarly, a cohort study in South Africa [75] found that 38% of traditionally circumcised men reported inconsistent condom use when having sex, and 8% of them reported never using condoms.

3.4.4 TMC and Knowledge of HIV Transmission

Lack of knowledge of HIV and other STIs among initiates and traditional circumcisers were reported in five studies [63-65, 73, 75]. Similar to medical circumcision, TMC initiates also believed that TMC protected them from STIs such as syphilis and gonorrhea and enhances

personal hygiene [65]. A cohort study [75] found that new initiates who went through traditional circumcision were mainly for cultural reasons, rather than HIV prevention.

Absence of information about HIV and other STIs prior to and after the circumcision was also reported as a HIV risk factor. For example, a study in Limpopo [63] found that traditional initiation school did not provide information about sexual health and HIV/AIDS and other STIs but tended to encourage new initiates to engage in risky sexual activities. Safer sexual behavior such as condom use and being faithful with one sex partner was not considered a part of initiation school programs. This was acknowledged by initiates, who said that they obtain the information about condom from local clinics and mass media [63]. A qualitative study in South Africa [70] found that absence of information has led to lack of understanding about the correlation between circumcision and HIV transmission.

Lack of knowledge of the mode HIV transmission was not only in TMC initiates but also among traditional circumcisers reflected in encouraging sex adventure, using one knife for several initiates, sharing bandages for several initiates, and ignorance of unhygienic environment [64]. A study in Tanzania [76] revealed that most of the traditional circumcisers did not associate between traditional circumcision practice and HIV/AIDS, assuming that HIV/AIDS was an urban disease. However, another finding of the same study also showed that careless mistakes performed by traditional circumcisers by not using any protection such as gloves when cutting the foreskin of the penis increased the risk of HIV transmission.

4. Discussion

4.1 TMC Practices and HIV Transmission

The findings show evidence that TMC as a cultural practice remains practiced in some communities in LMICs in Africa and Asia. The majority of the studies [44, 62-66, 68-71, 76-78, 80] reported that TMC in communities is not merely to cut off the foreskin but also to live up the tradition, keep the relation with their ancestors, and to teach and inherit cultural values and the values of 'manhood' to new initiates. The practice of TMC is highly valued as a secret and sacred practice, taking weeks and months from the separation step until the new initiates returned to the families and communities. Secretness and sacredness aspects in TMC may have led to difficulties to health intervention to control safety procedure. Such practice and its potential health risk factors reflects the high value the community puts on culture or tradition rather than any other types of medical or modern health intervention.

Studies in many communities in Africa found that TMC is a compulsory practice where all men were required to be traditionally circumcised, leaving challenges at individual and family level for those who did not undergo such practice. At the individual level, TMC causes psychological impacts for uncircumcised men and those followed medical circumcision including feeling ashamed, stressed, and pressured. These impacts were supported by the cultural values that put TMC as a standard of maturity of men. In addition to experiencing pressure from family and community, uncircumcised men also felt pressure from girls or women who preferred to build a relationship or to have sexual intercourse with traditionally circumcised men [44, 62, 65, 69].

Such impacts were also attributed for those who were not completely follow the process of TMC or mixed with medical circumcision. Although studies included in this review did not report the challenges of TMC on family, it is plausible to argue that family would be impacted if young men within the family did not undergo TMC.

Not undergoing TMC could also lead to negative social challenges such as stigma, discrimination, and disrespect towards men [63, 67, 87]. For example, those who did not undergo TMC could be labelled immature, irresponsible and easily ridiculed, humiliated, and mocked. In families and communities, traditionally uncircumcised men were stigmatized as the cause of any crime or irresponsible actions. Similarly, they did not have full rights to talk, discuss and negotiate with elders about families and communities' problems. They are labelled and treated without a respect (e.g., like a dog) which implies that they are considered less than human. Such impacts are in line with the components of stigma, such as labeling human differences, hegemony cultural practice associated labelled persons to undesirable characteristics, labeled persons are separated with the term "us" and "them", labelled persons experience loss of status and discrimination, and labelled persons experience difficulties in access to social, economic and political power [67, 92]. Similar to psychological impacts, all the studies included in the review mostly focus on stigma on initiates and thus less concern on stigma on family. Stigma, discrimination, and disrespect experienced by initiates prior to circumcision and uncircumcised men also reflect lack of social and psychological support from their families, friends, and communities.

TMC is generally assumed to have implications for HIV transmission [44, 63, 64, 72, 73, 75, 76, 78]. Unsafe procedure of TMC practices such as using one knife to circumcise several initiates, not wearing gloves when circumcise initiates, and unhygienic environment, raising the concern of on potential spread of infectious diseases, including HIV [64, 72, 76]. In addition to learn about culture and manhood in the transition period, initiates were also taught about exploring their sexuality, leading initiates to consider TMC as a 'gateway' to have unquestionable sex adventure and to have more than one sexual partner. For example, initiates were asked to have sexual intercourse with women who have had sex before as reported in a previous study. For example, initiates were asked to have sexual intercourse with women who have had sex before which is in line with another study [93] reporting that initiates were required to have sexual intercourse without protection several days before the wound heals as a way to speed up the recovery process The correlation between TMC and the risk of HIV transmission is also related with the belief that TMC has the same protective effects as using a condom. This belief may also be supported by the sacredness aspect of TMC rite, believing that the dead ancestors will intervene in the health of the initiates as in line with previous studies [62, 76]. Another supporting factor for TMC and the risk of HIV transmission is lack of knowledge on the mode of HIV transmission. In some communities, safe sexual behavior was not part of the subjects taught during TMC rite, leading initiates to have no knowledge about HIV risk. This is in line with a finding in another study among 100 participants, of whom 67% of them were not aware of the risk of traditional circumcision for HIV transmission [94]. However, the risks for HIV transmission were also reported among initiates who had knowledge about HIV transmission. Findings of a previous study suggest that circumcised men who had knowledge about HIV preventive measure of male

circumcision and believed that male circumcision could reduce the risk of HIV infection were more likely to engage in risky sexual behaviors or sex without condoms with multiple partners [95]. The risks for HIV transmission in the practice of TMC reflect lack of education, public awareness campaign and counseling for young men, parents, students, local leaders, and traditional circumcisers in the community practicing TMC.

4.2 Implications for Future Intervention

The systematic review provides a range of negative impacts of not being traditionally circumcised on men and scant information on the impacts on their families. Overall, the studies highlight psychological and social challenges that need to be addressed in communities practicing TMC. The studies also highlight TMC and the risk for HIV transmission which require future health interventions.

In this review, it is obvious that stigma, discrimination, and disrespect towards uncircumcised men or those who followed medical circumcision were within initiates' family and communities. This is because TMC is viewed more prestigious than any other circumcisions. It is suggested to have continuous counseling, approach, and education on communities where traditional beliefs and norms are still highly valued [63]. These approaches should reach not only family but also community and school. In light of the TMC and the risk for HIV transmission, it is noted that in some communities TMC has no role to play in preventing HIV and other STIs transmission such as promoting multiple sexual intercourse, not using condoms, and believing the full protection of circumcision against HIV transmission. To address this problem, education to target traditional circumcisers, traditional leaders, parents, and young men are required in order to improve the safe practice and prevent HIV transmission as reported in several studies [63, 80, 96]. Similarly, education on condom use and free, accessible condoms should also reach the camps where TMC practices were performed [63]. In addition, service delivery on providing free HIV testing for initiates in communities practicing TMC is needed.

4.3 Strengths and Limitations of the Study

Although many studies on male circumcision have been conducted mostly in Africa and some in Asia, this review is, as far as the researchers know, the first known study on TMC, the risk for HIV transmission and impacts on them and their families. The use of six databases and multiple search terms across 18 included studies helped the researchers conducted a comprehensive systematic review of the literature and provided a broad range of studies in LMICs. The inclusion of qualitative, quantitative, mixed methods helps the researchers to collate the current knowledge and knowledge gaps aimed the risk factors and impact of TMC on men and their families. Finally, the publications, the study selection methods, and the appraisal process altogether provided a substantial evidence that supports the key findings reported in the literature review. However, the literature review only included articles published in English which may have narrowed the scope and the authors may have missed the topic reported in other languages.

4.4 Implications for Future Studies

The review of the literature documents existing evidence and knowledge gaps about TMC, HIV risk, and its impact on men and their families. The review of the literature suggests that the previous studies mainly focus on the correlation on TMC and the risk for HIV transmission; none has explored TMC, HIV risk and its impacts on men and their families and none involved traditionally circumcised men living with HIV. Similarly, most of the included studies were in Africa settings, only one study was in PNG. Exploring TMC practice in different settings other than in Africa can help understand the similarities and differences of TMC practices and the implicaion on HIV transmission and its impact on men and their families. The review found very limited studies involved wives of married men who have done traditional circumcision and women that have unprotected sexual intercourse with newly traditional circumcised men to explore their views and sexual practices in relation to TMC. Furthermore, none of the included studies explored the views of health professionals and policy makers on TMC and its possible negative health consequences and how these have been addressed at policy level. Also, there is very limited studies exploring traditional circumcisers' views on the TMC and HIV risk. Future studies are required to fill these gaps of knowledge which may provide useful information for the development of specific interventions for safer TMC and preventing HIV and other STIs transmission.

5. Conclusion

The review presents three main themes namely TMC as a cultural practice, consequences of not being traditionally circumcised, and TMC-related risk of HIV transmission. These themes provide evidence that TMC and HIV risk could bring significant and negative challenges for men and their families. This review may be useful in designing programs to address social and psychological impacts associated with TMC practice in communities and integration of health intervention with medical circumcision.

Contributors
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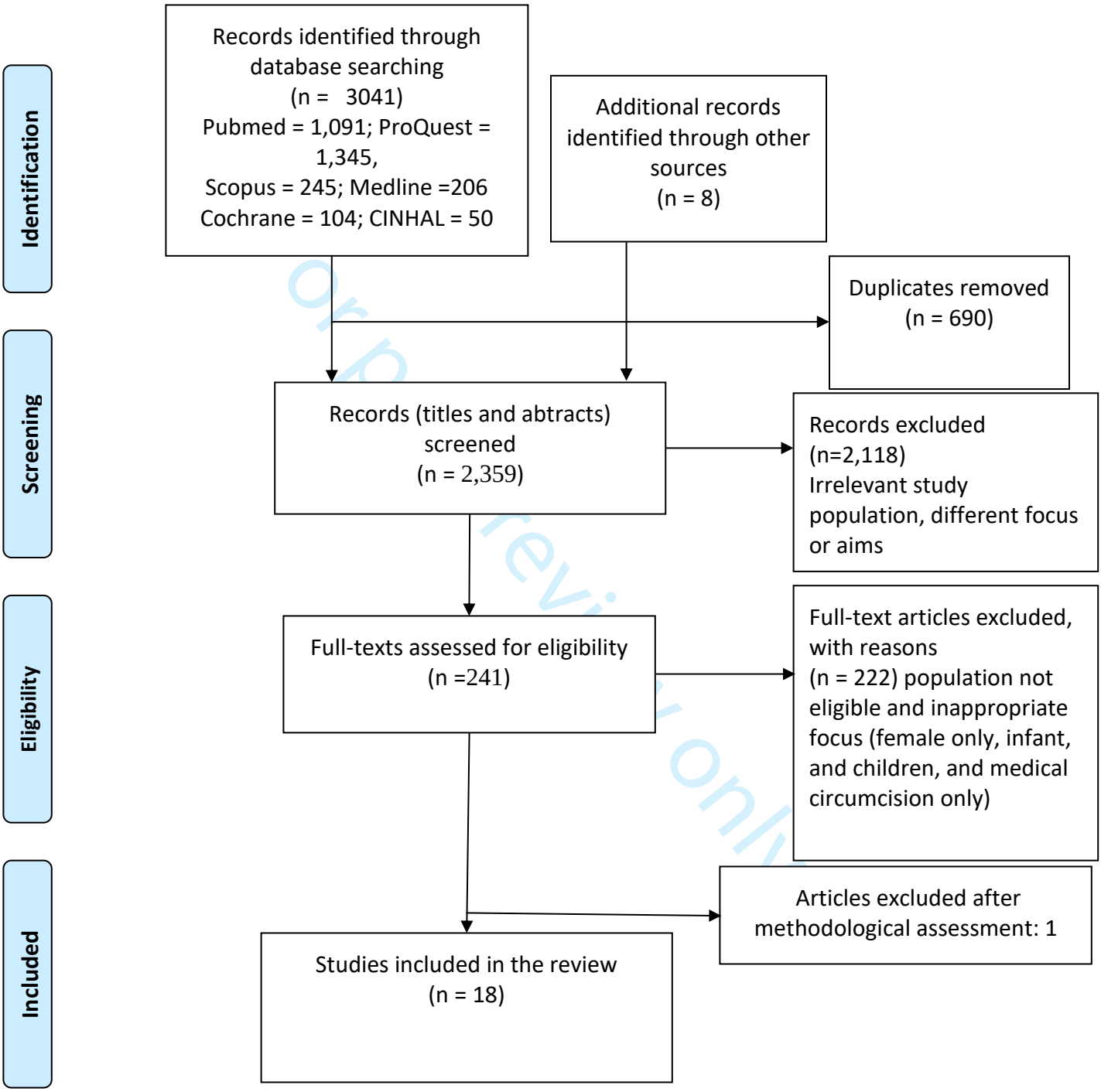
Figure 1: PRISMA Flow diagram of systematic literature search: records identified, removed, screened, and included in the review.



Appendix 1

Cochrane Database

ID	SEARCH	RESULT
#1	(Circumcision):ti,ab,kw	823
#2	(male circumcision):ti,ab,kw	644
#3	(Traditional circumcision):ti,ab,kw	28
#4	(traditional initiation):ti,ab,kw	530
#5	(traditional male initiation):ti,ab,kw	215
#6	(TMC):ti,ab,kw	153
#7	(traditional male circumcision):ti,ab,kw	22
#8	(indigenous male circumcision):ti,ab,kw	0
#9	(traditionally circumcised):ti,ab,kw	7
#10	(traditionally circumcised male):ti,ab,kw	7
#11	(open circumcision):ti,ab,kw	37
#12	(traditional men circumcision):ti,ab,kw	4
#13	(sifon):ti,ab,kw	1
#14	(traditionally circumcised men):ti,ab,kw	7
#15	(traditionally circumcised husband):ti,ab,kw	0
#16	(traditional practice of male circumcision):ti,ab,kw	4
#17	(practice of traditional men circumcision):ti,ab,kw	0
#18	(ritual traditional circumcision):ti,ab,kw	1
#19	(ritual initiation):ti,ab,kw	4
#20	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19	1,505
#21	(HIV infect*):ti,ab,kw	22,735
#22	(HIV prevention):ti,ab,kw	7,379
#23	(HIV control):ti,ab,kw	9,181
#24	(human immunodeficiency virus):ti,ab,kw	13,087
#25	(AIDS):ti,ab,kw	11,037
#26	(sexually transmitted infections):ti,ab,kw	1,782
#27	(risk of HIV infection):ti,ab,kw	4,161
#28	(HIV transmission):ti,ab,kw	2,970
#29	(sexually transmitted diseas*):ti,ab,kw	2,307
#30	#21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29	34,349
#31	(impact*):ti,ab,kw	140,990
#32	(psychological wellbeing):ti,ab,kw	7,265
#33	(distress):ti,ab,kw	24,913
#34	(economic impacts):ti,ab,kw	481

#35	(social effect):ti,ab,kw	18,607
#36	(stigma):ti,ab,kw	2,829
#37	(discrimination):ti,ab,kw	6,029
#38	(unproductive husband):ti,ab,kw	0
#39	(loss of job):ti,ab,kw	274
#40	(loss income):ti,ab,kw	717
#41	(health):ti,ab,kw	275,486
#42	(powerlessness):ti,ab,kw	55
#43	(worthlessness):ti,ab,kw	48
#44	(social distance):ti,ab,kw	1,128
#45	(social isolation):ti,ab,kw	1,536
#46	(stress):ti,ab,kw	69,129
#47	(mental health):ti,ab,kw	36,701
#48	#31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47	440,867
#49	(Developing countries):ti,ab,kw	4,556
#50	(less developed):ti,ab,kw	11,004
#51	(disadvantaged):ti,ab,kw	1,475
#52	(resource limited):ti,ab,kw	2,307
#53	(poor):ti,ab,kw	47,530
#54	(low*):ti,ab,kw	444,090
#55	(middle income*):ti,ab,kw	4,451
#56	(region*):ti,ab,kw	57,105
#57	(area*):ti,ab,kw	125,969
#58	(low resource regions):ti,ab,kw	86
#59	(resource limited regions):ti,ab,kw	62
#60	(resource limited countr*):ti,ab,kw	603
#61	(pacific countries):ti,ab,kw	206
#62	(developed countries):ti,ab,kw	3,507
#63	#49 OR #50 OR #51 OR #52 OR #53 OR #54 OR #55 OR #56 OR #57 OR #58 OR #59 OR #60 OR #61 OR #62	604,139
#64	**#20 AND #30 #48 AND #63**	**104**

Pubmed

ID	Search	Result
#1	Circumcision	9,524
#2	Male circumcision	7,140
#3	Traditional circumcision	724
#4	Traditional initiation	25,522

#5	Traditional male initiation	7,538
#6	TMC	18,118
#7	Traditional male circumcision	433
#8	Indigenous male circumcision	18
#9	Traditionally circumcised	104
#10	Traditionally circumcised male	85
#11	Open circumcision	189
#12	Traditional men circumcision	132
#13	Sifon	6
#14	Traditionally circumcised men	46
#15	Traditionally circumcised husband	3
#16	Traditional practice of male circumcision	231
#17	Practice of traditional men circumcision	89
#18	Ritual traditional circumcision	81
#19	Ritual initiation	376
#20	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19	53,328
#21	HIV infect*”	321, 398
#22	HIV prevention	110,968
#23	HIV control	118,789
#24	human immunodeficiency virus	414,981
#25	AIDS	295,363
#26	sexually transmitted infections	382,177
#27	risk of HIV infection	91,619
#28	HIV transmission	61,338
#29	sexually transmitted diseas*	47,282
#30	#21 OR #22 OR 23 #24 OR #25 OR #26 OR #27 OR #28 OR #29	606,521
#31	impact*	1,451,654
#32	psychological wellbeing	40,200
#33	distress	173,116
#34	economic impacts	134,222
#35	social effect	373,469
#36	stigma	35,752
#37	discrimination	328,352
#38	unproductive husband	3
#39	loss of job	3,248
#40	loss income	7,152
#41	health	5,932,617
#42	powerlessness	2,188
#43	worthlessness	907
#44	social distance	18,568

#45	social isolation	41,345
#46	stress	1,181,113
#47	mental health	471,114
#48	#31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47	8,094,384
#49	Developing countries	152,805
#50	less developed	397,001
#51	disadvantaged	115,498
#52	resource limited	112,693
#53	poor	753,973
#54	low*	2,817,510
#55	middle income*	78,651
#56	region*	2,238,390
#57	area*	1,819,969
#58	low resource regions	41,929
#59	resource limited regions	46,087
#60	resource limited countr*	17,754
#61	pacific countries	8,089
#62	developed countries	100,459
#63	#49 OR #50 OR #51 OR #52 OR #53 OR #54 OR #55 OR #56 OR #57 OR #58 OR #59 OR #60 OR #61 OR #62	7,164,066
#64	**#20 AND #30 AND #48 AND #63**	**1,091**

CINHAL (15/9/2022)

ID	Data search	Result
S1	Circumcision	2,744
S2	male circumcision	1,799
S3	traditional circumcision	69
S4	Traditional initiation	62
S5	Traditional male initiation	5
S6	TMC	279
S7	Traditional male circumcision	25
S8	Indigenous male circumcision	1
S9	Traditionally circumcised	15
S10	Traditionally circumcised male	3
S11	Open circumcision	2
S12	Traditional men circumcision	8
S13	Sifon	3
S14	Traditionally circumcised men	8

S15	Traditionally circumcised husband	28
S16	Traditional practice of male circumcision	4
S17	Practice of traditional men circumcision	863
S18	Ritual traditional circumcision	2
S19	Ritual initiation	14
S20	Circumcision OR male circumcision OR traditional circumcision OR traditional initiation OR traditional male initiation OR TMC OR traditional male circumcision OR indigenous male circumcision OR traditionally circumcised OR traditionally circumcised male OR open circumcision OR traditional men circumcision OR sifon OR traditionally circumcised men OR traditionally circumcised husband OR traditional practice of male circumcision OR practice of traditional men circumcision OR ritual traditional circumcision OR ritual initiation	3,085
S21	HIV infect*	90,037
S22	HIV prevention	26,675
S23	HIV control	24,023
S24	human immunodeficiency virus	126,951
S25	AIDS	72,540
S26	sexually transmitted infections	14,067
S27	risk of HIV infection	9,134
S28	HIV transmission	14,251
S29	sexually transmitted diseas*	17,446
S30	HIV infect* OR HIV prevention OR HIV control OR human immunodeficiency virus OR AIDS OR sexually transmitted infections OR risk of HIV infection OR HIV transmission OR sexually transmitted diseas*	175,524
S31	impact*	459,260
S32	psychological wellbeing	1,672
S33	distress	69,006
S34	economic impacts	6,098
S35	social effect	11,476
S36	stigma	28,392
S37	discrimination	39,690
S38	unproductive husband	1
S39	loss of job	1,187
S40	loss income	686
S41	Health impacts	44,686
S42	powerlessness	1,623
S43	worthlessness	228
S44	social distance	973
S45	social isolation	13,906
S46	stress	244,267

S47	mental health	180,215
S48	impact* OR psychological wellbeing OR distress OR economic impacts OR social effect OR stigma OR discrimination OR unproductive husband OR loss of job OR loss income OR health impacts OR powerlessness OR worthlessness OR social distance OR social isolation OR stress OR mental health	916,125
S49	Developing countries	32,517
S50	less developed	1,705
S51	disadvantaged	9,081
S52	resource limited	10,721
S53	poor	167,926
S54	low*	898,051
S55	middle income*	15,462
S56	region*	206,608
S57	area*	361,412
S58	low resource regions	39
S59	resource limited regions	119
S60	resource limited countr*	982
S61	pacific countries	580
S62	developed countries	13,338
S63	S49 OR S50 OR S51 OR S52 OR S53 OR S54 OR S55 OR S56 OR S57 OR S58 OR S59 OR S60 OR S61 OR S62	1,448,156
S64	(Circumcision OR “male circumcision” OR “traditional circumcision” OR “traditional initiation” OR “traditional male initiation” OR TMC OR “traditional male circumcision” OR “indigenous male circumcision” OR “traditionally circumcised” OR “traditionally circumcised male” OR “open circumcision” OR “traditional men circumcision” OR sifon OR “traditionally circumcised men” OR “traditionally circumcised husband” OR “traditional practice of male circumcision” OR “practice of traditional men circumcision” OR “ritual traditional circumcision” OR “ritual initiation”) AND (“HIV infect*” OR “HIV prevention” OR “HIV control” OR “human immunodeficiency virus” OR AIDS OR “sexually transmitted infections” OR “risk of HIV infection” OR “HIV transmission” OR “sexually transmitted diseas*”) AND (“impact*” OR “psychological wellbeing” OR distress OR “economic impacts” OR “social effect” OR stigma OR discrimination OR “unproductive husband” OR “loss of job” OR “loss income” OR “health impacts” OR powerlessness OR worthlessness OR “social distance” OR “social isolation” OR stress OR “mental health”) AND (“developing countries” OR “less developed” OR disadvantaged OR “resource limited” OR poor OR low* OR	50

	"middle income*" OR region* OR area* OR "low resource regions" OR "resource limited regions" OR "resource limited countr*" OR "developed countries" OR "pacific countries")	

Medline (15/09/22)

ID	Key Search	Result
S1	Circumcision	9,374
S2	male circumcision	6,065
S3	traditional circumcision	195
S4	Traditional initiation	165
S5	Traditional male initiation	12
S6	TMC	2,949
S7	Traditional male circumcision	61
S8	Indigenous male circumcision	2
S9	Traditionally circumcised	23
S10	Traditionally circumcised male	6
S11	Open circumcision	14
S12	Traditional men circumcision	12
S13	Sifon	5
S14	Traditionally circumcised men	13
S15	Traditionally circumcised husband	63
S16	Traditional practice of male circumcision	14
S17	Practice of traditional men circumcision	3,083
S18	Ritual traditional circumcision	8
S19	Ritual initiation	43
S20	Circumcision OR male circumcision OR traditional circumcision OR traditional initiation OR traditional male initiation OR TMC OR traditional male circumcision OR indigenous male circumcision OR traditionally circumcised OR traditionally circumcised male OR open circumcision OR traditional men circumcision OR sifon OR traditionally circumcised men OR traditionally circumcised husband OR traditional practice of male circumcision OR practice of traditional men circumcision OR ritual traditional circumcision OR ritual initiation	12,495
S21	HIV infect*	270,768
S22	HIV prevention	30,071
S23	HIV control	15,837
S24	human immunodeficiency virus	113,022
S25	AIDS	299,295

S26	sexually transmitted infections	36,312
S27	risk of HIV infection	14,681
S28	HIV transmission	22,859
S29	sexually transmitted diseas*	45,085
S30	HIV infect* OR HIV prevention OR HIV control OR human immunodeficiency virus OR AIDS OR sexually transmitted infections OR risk of HIV infection OR HIV transmission OR sexually transmitted diseas*	509,496
S31	impact*	1,446,702
S32	psychological wellbeing	2,963
S33	distress	162,321
S34	economic impacts	22,060
S35	social effect	27,700
S36	stigma	36,196
S37	discrimination	168,953
S38	unproductive husband	3
S39	loss of job	2,135
S40	loss income	1,788
S41	Health impacts	107,509
S42	powerlessness	1,391
S43	worthlessness	456
S44	social distance	4,093
S45	social isolation	24,605
S46	stress	1,141,833
S47	mental health	396,591
S48	impact* OR psychological wellbeing OR distress OR economic impacts OR social effect OR stigma OR discrimination OR unproductive husband OR loss of job OR loss income OR health impacts OR powerlessness OR worthlessness OR social distance OR social isolation OR stress OR mental health	3,099,234
S49	Developing countries	146,228
S50	less developed	10,682
S51	disadvantaged	16,667
S52	resource limited	34,488
S53	poor	699,351
S54	low*	4,964,973
S55	middle income*	35,250
S56	region*	2,226,728
S57	area*	1,811,466
S58	low resource regions	164
S59	resource limited regions	561
S60	resource limited countr*	3,538

S61	pacific countries	1,961
S62	developed countries	67,110
S63	developing countries OR less developed OR disadvantaged OR resource limited OR poor OR low* OR middle income* OR region* OR area* OR low resource regions OR resource limited regions OR resource limited countr* OR developed countries OR pacific countries	8,482,340
S64	(Circumcision OR male circumcision OR traditional circumcision OR traditional initiation OR traditional male initiation OR TMC OR traditional male circumcision OR indigenous male circumcision OR traditionally circumcised OR traditionally circumcised male OR open circumcision OR traditional men circumcision OR sifon OR traditionally circumcised men OR traditionally circumcised husband OR traditional practice of male circumcision OR practice of traditional men circumcision OR ritual traditional circumcision OR ritual initiation) AND (HIV infect* OR HIV prevention OR HIV control OR human immunodeficiency virus OR AIDS OR sexually transmitted infections OR risk of HIV infection OR HIV transmission OR sexually transmitted diseas*) AND (impact* OR psychological wellbeing OR distress OR economic impacts OR social effect OR stigma OR discrimination OR unproductive husband OR loss of job OR loss income OR health impacts OR powerlessness OR worthlessness OR social distance OR social isolation OR stress OR mental health) AND (developing countries OR less developed OR disadvantaged OR resource limited OR poor OR low* OR middle income* OR region* OR area* OR low resource regions OR resource limited regions OR resource limited countr* OR developed countries OR pacific countries)	206

Scopus (13/9/2022)

(TITLE-ABS-KEY (circumcision OR "male circumcision" OR "traditional circumcision" OR "traditional initiation" OR "traditional male initiation" OR tmc OR "traditional male circumcision" OR "indigenous male circumcision" OR "traditionally circumcised" OR "traditionally circumcised male" OR "open circumcision" OR "traditional men circumcision" OR sifon OR "traditionally circumcised men" OR "traditionally circumcised husband" OR "traditional practice of male circumcision" OR "practice of traditional men circumcision" OR "ritual traditional circumcision" OR "ritual initiation")) AND (TITLE-ABS-KEY ("HIV infect*" OR "HIV prevention" OR "HIV control" OR "human immunodeficiency virus" OR aids OR "sexually transmitted infections" OR "risk of HIV infection" OR "HIV transmission" OR "sexually transmitted diseas*")) AND (TITLE-ABS-KEY ("impact*" OR "psychological

wellbeing" OR distress OR "economic impacts" OR "social effect" OR stigma OR discrimination OR "unproductive husband" OR "loss of job" OR "loss income" OR "health impacts" OR powerlessness OR worthlessness OR "social distance" OR "social isolation" OR stress OR "mental health")) AND (TITLE-ABS-KEY ("developing countries" OR "less developed" OR disadvantaged OR "resource limited" OR poor OR low* OR "middle income*" OR region* OR area* OR "low resource regions" OR "resource limited regions" OR "resource limited countr*" OR "developed countries" OR "pacific countries"))

Result: 245

Proquest (15/09/2022)

noft(Circumcision OR “male circumcision” OR “traditional circumcision” OR “traditional initiation” OR “traditional male initiation” OR TMC OR “traditional male circumcision” OR “indigenous male circumcision” OR “traditionally circumcised” OR “traditionally circumcised male” OR “open circumcision” OR “traditional men circumcision” OR sifon OR “traditionally circumcised men” OR “traditionally circumcised husband” OR “traditional practice of male circumcision” OR “practice of traditional men circumcision” OR “ritual traditional circumcision” OR “ritual initiation”) AND (“HIV infect*” OR “HIV prevention” OR “HIV control” OR “human immunodeficiency virus” OR AIDS OR “sexually transmitted infections” OR “risk of HIV infection” OR “HIV transmission” OR “sexually transmitted diseas*”) AND (“impact*” OR “psychological wellbeing” OR distress OR “economic impacts” OR “social effect” OR stigma OR discrimination OR “unproductive husband” OR “loss of job” OR “loss income” OR “health impacts” OR powerlessness OR worthlessness OR “social distance” OR “social isolation” OR stress OR “mental health”) AND (“developing countries” OR “less developed” OR disadvantaged OR “resource limited” OR poor OR low* OR “middle income*” OR region* OR area* OR “low resource regions” OR “resource limited regions” OR “resource limited countr*” OR “developed countries” OR “pacific countries”)

Result: 1345

Supplementary File 1

Author/year	Study Location	Study Design/Study Aim	Number/Age of Participants	Analysis	Main Themes of TMC, HIV risk, Impacts on Men and Their Families
Douglas, et al., 2018 [1]	Eastern Cape, South Africa	(i) Mixed method design (ii) Methods: • Cross-sectional survey • Focus group discussion (FDG) (iii) Aim: • to describe social determinants and explore economic determinants related to traditional circumcision of boys from 12 to 18 years of age in Libode rural communities in Eastern Cape Province	(i) Number of participants • 1036 men (ii) Participant age • 12-18 years old	Thematic analysis Descriptive statistics	**TMC and HIV risk** (i) TMC • TMC as a cultural practice • Reasons to undergo TMC (ii) HIV Risk • Initiates have no knowledge on TMC and HIV transmission • Initiates have no opportunities to talak about TMC and HIV risks
Greely, 2013 [2]	South Africa	(i) Qualitative design (ii) Method: FGD (iii) Aim: • to understand the importance of male circumcision as a risk-reducing strategy by exploring perceptions of young men and women	(i) Number of participants • 15 participants (10 men and 5 women) (ii) Participant age • 15 years and above	Thematic Analysis	**TMC, HIV risk, impacts on men and their families** (i) TMC • TMC as a rite of passage to adulthood • TMC defines being a 'real' man • Traditional initiates receive teaching and guidance from elders • Initiates received more respects • To fulfill or live up to cultural expectations (ii) HIV risk • Initiates were taught to have sexual intercourse • Initiates were keen to prove manhood with unprotective sex intercourse

					• The belief that TMC reduced risk of HIV transmission (iii) Impacts • Uncircumcised men were subject to stigma, discrimination, and disrespect • Uncircumcised men were haunted by bad luck • Women believed traditionally circumcised men are more responsible and less abusive
Gwata, 2009 [3]	Xhosa, South Africa	(i) Qualitative design (ii) Method: interview (iii) Aim • to explore the socio-cultural perceptions of Xhosa-speaking men on traditional male circumcision	(i) Number of participants • 5 men (ii) Participant age • 19-30 years	Thematic analysis	**TMC and HIV risk** (i) TMC • TMC as an agent of socialization within community • TMC tests man's ability to endure pain • Initiates experienced social pressure to undergo TMC (ii) HIV risk • Lack of knowledge on TMC and HIV transmission •
Kelly, et al., 2012 [4]	Papua New Guinea	(i) Qualitative design (ii) Method: • interview and FGD (iii) Aim • to map contemporary MC and other penile cutting practices, and the socio-cultural dimensions underpinning these practices	(i) Number of participants • 276 men (51 men underwent TMC) • 210 women (ii) Participant age Not reported	Thematic analysis	**TMC, HIV risk, impacts on men and their families** (i) TMC • TMC is a compulsory practice • TMC is sacred and secret practice (ii) HIV risk • Reusing of non-sterile cutting equipment • Lack of knowledge of risk of non-sterile equipment and HV transmission (iii) Impacts

					• Uncircumcised men felt stigmatized, ridiculed, and mocked • Family members of uncircumcised men were looked down within the community
Lagarde, et al., 2003 [5]	South Africa	(i) Quantitative design: • cross sectional study (ii) Aim • to measure the prevalence and associated factors of MC in a South African township, and to assess its acceptability as a tool for HIV prevention	(i) Number of participants • 482 men (108 underwent TMC) and 302 women (ii) Participant age • 19-29 years	Multivariate analysis	**HIV risk and impacts on men** (i) HIV risk • Circumcised men did not need to use condoms • The belief that TMC protected against HIV transmission • Initiates had sex during healing period (ii) Impacts • TMC proved manhood Initiates obtained respect from peers and women
Malisha et al., 2008 [6]	Limpopo, South Africa	(i) Qualitative design (ii) Method: interview (iii) Aim • to investigate the role and significance of traditional initiation schools from the perspectives of young people in Venda, a part of South Africa where initiation schools, for some young people, still form an important part of the rite of passage to adulthood.	(i) Number of participants • 17 men and 17 women (ii) participant age • 13-20 years	Thematic analysis	**TMC, HIV risk and impacts on men** (i) TMC • TMC prepares initiates to be a 'real' man • Initiation school is important for socialization (ii) HIV risk • Initiation schools encouraged initiates to engage in sexual activities • Lack of information on HIV and condom use during initiation school • Initiates engaged in sexual intercourse without a condom • Traditional healers did not use sterilised equipment. (iii) Impacts

					• Uncircumcised men experienced rejection • Uncircumcised men were considered not a 'real' man, irresponsible
Mavundla, et al., 2009 [7]	Xhosa, South Africa	(i) Qualitative design (ii) Method: interview (iii) Aim • to explore and describe Xhosa beliefs and practices regarding cultural male circumcision ritual in the Eastern Cape Province in South Africa to support nurses in providing culturally competent care	(i) Number of participants • 25 men (ii) participant age • Not reported	Thematic analysis	**TMC and impacts on men** (i) TMC • Process of TMC • TMC as a sacred and secret cultural practice • TMC did not allow initiates to seek for medical treatment • Expectation following being traditionally circumcised • TMC connects initiates with ancestors (ii) impacts • Uncircumcised men experienced rejection and negative labeling • Circumcised men obtained respect
Mavundla, et al., 2010 [8]	East London, South Africa	(i) Qualitative design (ii) Method: interview (iii) Aim • to describe the experience of newly initiated Xhosa men in East London, South Africa	(i) Number of participants • 14 men (ii) participant age • 15-20 years	Thematic analysis	**TMC and impacts on men** (i) TMC • TMC as a cultural practice (ii) impacts • Uncircumcised men experienced stigma rejection by family, community, peers, opposite sex • Uncircumcised men experienced lack of respect
Mboera et al., 2009 [9]	Tanzania	(i) Quantitative design: • Cross sectional study (ii) Aim • to underscore challenges and opportunities for the involvement of traditional	(i) Number of participants • 324 men and 277 women (ii) participant age • 12-45 years	Thematic analysis	**TMC, HIV risk, and impacts on men and their families** (i) TMC • TMC as a cultural practice • Reasons to undergo TMC (ii) HIV risk

		practitioners in scaling up safe male circumcision as a measure to support global efforts of preventing HIV transmission			• Using the same knife to circumcise several initiates • Lack of knowledge of the possibility of HIV transmission through TMC (iii) impacts • Uncircumcised men were segregated by community • Uncircumcised men experienced lack of respect •
Mpateni, et al., 2020 [10]	Alice, Eastern Cape, South Africa	(i) Qualitative design (ii) Method: FGD (iii) Aim • to examine the health hazards associated with the contemporary traditional circumcision rite in Alice, Eastern Cape, South Africa	(i) Number of participants • 23 male and 2 female (ii) participant age • 18-70 years	Thematic analysis	**TMC and HIV risk** (i) HIV Risk • Initiates have to have sex with several sexually experienced women • Unhygienic environment in camp or bush during TMC practices •
Mshana, et al., 2011 [11]	North Eastern, Tanzania	(i) Qualitative design (ii) Method: FGD (iii) Aim • to understand how traditionally circumcising communities where MC carries considerable social meaning and significance would respond to male circumcision (MC) program as an additional intervention against HIV infection	(i) Number of participants • 41 men and 50 women (ii) participant age • 18-44 years	Thematic analysis	**TMC and impacts on men** (i) TMC • TMC as a cultural practice • Process of TMC • Reasons to undergo TMC (ii) impacts • Uncircumcised men experienced stigmatization and ridiculing
Munthali, et al., 2007 [12]	Malawi	(i) Qualitative and quantitative design(ii) Method: • Cross sectional survey •interview	(i) Number of participants • 102 men and women (ii) participant age • 12-19 years	Thematic analysis	**TMC and HIV risk** (i) TMC • TMC as a cultural practice • Reasons to undergo TMC

		(iii) Aim: • quantitative data is used to examine timing of pubertal changes for boys and girls and the extent to which puberty is marked by initiation ceremonies and rites in the country. • Quantitative data is used in order to understand how adolescents know about issues relating to sexuality and what meanings they attach to various puberty changes as they experience them.		Descriptive statistics	(ii) HIV risk • Initiates had sex without protection • Lack of knowledge on TMC and HIV transmission • TMC promotes sex adventure for new initiates
Nyembezi, et al., 2014 [13]	Eastern Cape, South Africa	(i) Quantitative design: • cross-sectional study (ii) Aim: • to explore past sexual behaviors, reported substance use, and beliefs about initiation and male circumcision with regard to HIV prevention	(i) Number of participants • 1656 men (ii) participant age • Mean age 21	Logistic regression	**TMC and HIV risk** (i) HIV risk factors • Initiates had multiple sex partners • Initiates engaged in inconsistent condom use or unprotected sex with multiple sex partners • Belief that TMC protects against HIV and other STIs transmission
Nyembezi, et al., 2009 [14]	Eastern Cape, South Africa	(i) Quantitative design: • cross-sectional study (ii) Aim: • to report on the prevalence of consistent condom use and identify its psychosocial correlates to inform future HIV prevention strategies among traditionally circumcised men in rural areas	(i) Number of participants • 114 men (ii) participant age • 15-32 years	Logistic regression	**TMC and HIV risk** (i) HIV risk factors • Belief that TMC protects against HIV transmission • Initiates engaged in unprotected sex with multiple sex partners

		of the Eastern Cape Province of South Africa.			
Peltzer, et al., 2009 [15]	Mpumalanga, South Africa	(i) Qualitative design (ii) Method: interview (iii) Aim: • to assess the current behavioural risk reduction messages and HIV/ AIDS education provided by medical and traditional providers of male circumcision • to assess the risk-related behavioural beliefs regarding circumcision, HIV/ AIDS risks, condoms, and gender attitudes among men who have undergone elective medical circumcision and men who have been circumcised in traditional initiation schools in the past 18 months.	(i) Number of participants • 30 men (ii) participant age • 18-30 years	Thematic analysis	**TMC, HIV risk, and impacts on men** **(i) TMC** • TMC as a cultural practice • Reasons to undergo TMC (ii) HIV risk • Belief that TMC reduces risk of contracting HIV • Initiates engaged in sex prior to incomplete wound healing • Initiated engaged in inconsistent condom use or unprotected sex with multiple partners (iii) impacts • TMC is associated with social status and being respect
Sarvestani, et al., 2012 [16]	Uganda	(i) Qualitative design (ii) Method: FGD (iii) Aim: • to characterize TMC practices in Uganda and the cultural implications	(i) Number of participants • 208 men (ii) participant age • 14-18 years	Thematic analysis	**TMC** (i) TMC • TMC as a cultural practice • The process of TMC

Shi, et al., 2019 [17]	Kenya, Lesotho, Malawi, Mozambique, Namibia, Rwanda, Tanzania, Uganda, Zambia and Zimbabwe	• (i) Quantitative design • Cross sectional study (iii) Aim: • to understand the sexual risk behavior of men with traditional male circumcision and medical male circumcision in the context of the World Health Organization's (WHO) campaign for voluntary medical male circumcision (VMMC) scale-up	(i) Number of participants • 43,222 males (ii) participant age • 15-49 years	Ordinal regression	**TMC and HIV risk** (i) HIV risk • Initiates engaged unprotected sex with multiple partners • Belief that TMC protects against HIV
Siweya, et al., 2018 [18]	Limpopo, South Africa	(i) Qualitative design (ii) Method: FGD (iii) Aim: • to determine the notions of manhood in TMC by African adolescent boys in Ngove Village, Limpopo Province	(i) Number of participants • 20 males (ii) participant age • 13-18 years	Thematic analysis	**TMC and HIV risk** (i) TMC • TMC as a cultural practice • The role of TMC in role modeling (ii) HIV risk • TMC promotes sex adventure for initiates

Supplementary File 2: Assessment of methodological quality (qualitative and quantitative studies) (n=16)

Authors	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	%
Greely, et al., 2013	Y	Y	Y	Y	Y	N	N	Y	Y	Y	80%
Gwata, 2009	Y	Y	Y	Y	Y	N	N	Y	U	Y	70 %
Kelly, et al., 2012	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	90%
Lagarde, et al., 2003	Y	Y	Y	Y	Y	Y	Y	Y			100%
Malisha, et al., 2008	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	90%
Mavundla et al., 2009	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	90%
Mavundla, et al.,2010	Y	Y	Y	Y	Y	N	N	Y	Y	Y	80 %
Mboera, et al., 2009	Y	Y	Y	Y	Y	Y	N	Y			87%
Mpateni, et al., 2020	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	90%
Mshana, et al, 2011	Y	Y	Y	Y	Y	N	N	Y	Y	Y	80%
Nyembezi, et al.,2009	Y	Y	Y	Y	Y	Y	Y	Y			100%
Nyembezi, et al., 2014	Y	Y	Y	Y	Y	Y	Y	Y			100%
Peltzer, et al., 2009	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
Amir, et al., 2012	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	90%
Shi, et al., 2020	Y	Y	Y	Y	Y	Y	Y	Y			100%
Siweya, et al., 2018	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	90%

Q= Question; Y= Yes; N= No; U= Unclear

The 2011 Mixed Method studies checklist (n=2)

Category of study	Methodological quality criteria	Responses		
		Yes	No	Can't tell
Douglas, et al., 2018				
Screening questions	Are there clear qualitative and quantitative research questions (or objectives), or a clear mixed methods question (or objective)?	Yes		
	Do the collected data allow address the research question (objective)? E.g., consider whether the follow-up period is long enough for the outcome to occur (for longitudinal studies or study components).	Yes		
1. Qualitative	1.1 Are the sources of qualitative data (archives, documents, informants, observations) relevant to address the research question (objective)?	Yes		
	1.2 Is the process for analyzing qualitative data relevant to address the research question (objective)?	Yes		
	1.3 Is appropriate consideration given to how findings relate to the context, e.g., the setting, in which the data were collected?	Yes		
	1.4 Is appropriate consideration given to how findings relate to researchers' influence, e.g., through their interactions with participants?	Yes		
	1.5. Is there coherence between qualitative data sources, collection, analysis and interpretation?	Yes		
2. Quantitative	2.1 Is the sampling strategy relevant to address the quantitative research question (quantitative aspect of the mixed methods question)?	Yes		
	2.2 Is the sample representative of the population understudy?			Can't tell
	2.3 Are measurements appropriate (clear origin, or validity known, or standard instrument)?	Yes		
	2.4. Is the statistical analysis appropriate to answer the research question (or objectives)?	Yes		
3. Mixed methods	3.1 Is the mixed methods research design relevant to address the qualitative and quantitative research questions (or objectives), or the qualitative and quantitative aspects of the mixed methods question (or objective)?	Yes		
	3.2 Is the integration of qualitative and quantitative data (or results) relevant to address the research question (objective)?	Yes		
	3.3 Is appropriate consideration given to the limitations associated with this integration, e.g., the divergence of qualitative and quantitative data (or results) in a triangulation design?	Yes		
	Overall	Yes		

Category of study	Methodological quality criteria	Responses		
		Yes	No	Can't tell
Munthali, et al., 2007				
Screening questions	Are there clear qualitative and quantitative research questions (or objectives), or a clear mixed methods question (or objective)?	Yes		
	Do the collected data allow address the research question (objective)? E.g., consider whether the follow-up period is long enough for the outcome to occur (for longitudinal studies or study components).	Yes		
1. Qualitative	1.1 Are the sources of qualitative data (archives, documents, informants, observations) relevant to address the research question (objective)?	Yes		
	1.2 Is the process for analyzing qualitative data relevant to address the research question (objective)?	Yes		
	1.3 Is appropriate consideration given to how findings relate to the context, e.g., the setting, in which the data were collected?	Yes		
	1.4 Is appropriate consideration given to how findings relate to researchers' influence, e.g., through their interactions with participants?	Yes		
	1.5. Is there coherence between qualitative data sources, collection, analysis and interpretation?	Yes		
2. Quantitative	2.1 Is the sampling strategy relevant to address the quantitative research question (quantitative aspect of the mixed methods question)?	Yes		
	2.2 Is the sample representative of the population understudy?			Can't tell
	2.3 Are measurements appropriate (clear origin, or validity known, or standard instrument)?	Yes		
	2.4. Is the statistical analysis appropriate to answer the research question (or objectives)?	Yes		
3. Mixed methods	3.1 Is the mixed methods research design relevant to address the qualitative and quantitative research questions (or objectives), or the qualitative and quantitative aspects of the mixed methods question (or objective)?	Yes		
	3.2 Is the integration of qualitative and quantitative data (or results) relevant to address the research question (objective)?	Yes		
	3.3 Is appropriate consideration given to the limitations associated with this integration, e.g., the divergence of qualitative and quantitative data (or results) in a triangulation design?	Yes		
	Overall	Yes		

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	2
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	3
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	3
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	4-5
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	4
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	3-4
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	5-6
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	7
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	4-5
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	N/A
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	N/A
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	5

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	N/A
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	N/A
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	5-6 & Fig. 1
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	7 & Table 3
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	N/A
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	7-14
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	N/A
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	N/A
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	N/A
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	14-16
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	17
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	17
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	N/A

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Traditional male circumcision and the risk for HIV transmission among men: a systematic review

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ABSTRACT

Objectives: to synthesise evidence to determine whether, in contrast to medical male circumcision, traditional male circumcision (TMC) practices may contribute to HIV transmission and what the impacts of TMC are on the initiates, their families and societies.

Design: Systematic review.

Data Source: PubMed, CINHAL, SCOPUS, ProQuest, Cochrane database, and Medline were searched between 15 – 30 October 2022.

Eligibility criteria: (i) studies involving young men, young male adults, male adults, and mixed male and female participants; (ii) studies on TMC involving men living with HIV (married and non-married); (iii) studies on TMC, HIV transmission and impact in Low- and Middle-Income Countries (LMICs); (iv) qualitative, quantitative and mixed method studies, and (v) studies aimed at exploring TMC and how it contributes to HIV transmission and the impacts of HIV on circumcised men and their families.

Data extraction: Data were extracted based on study details, study design, characteristics of participants, and results.

Result: A total of 18 studies were included: 11 were qualitative studies, 5 were quantitative studies, and 2 were mixed-method studies. All the studies included were conducted in areas where TMC was performed (17 in Africa and 1 in Papua New Guinea/PNG). The review's findings were categorised into themes: TMC as a cultural practice, consequences of not being traditionally circumcised on men and their families, and TMC-related risk of HIV transmission.

Conclusion: This systematic review highlights that TMC practice and HIV risk could negatively impact men and their families. Existing evidence suggests that little attention has been paid to men and their families experiencing the impacts of TMC and HIV risk factors. The findings recommend the need for health intervention programs such as safe circumcision and safe sexual behaviours following TMC and efforts to address psychological and social challenges in communities practising TMC.

Prospero Number Registration: CRD42022357788.

Strengths and limitations of this study

- This is the first systematic review on TMC and the risk for HIV transmission in the males
- This systematic review was based on the systematic literature search following Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA)
- The scientific quality of each included study was appraised using critical appraisal tools
- A large number of synonyms of TMC were included
- The literature review included articles published in English only

I. Introduction

Circumcision is a cultural practice older than written history can explain, can be traced back to pre-Abrahamic times, and can be found in many Judeo-Christian traditions in Africa [1, 2]. It may also be one of the world's oldest human surgical procedures [3]. It is a practice that has been widely performed on boys and young men by cutting off the foreskin of the penis as a rite of passage to mark the transition from childhood to manhood, primarily for religious and cultural reasons/beliefs [4, 5]. In many parts of the world, it has traditionally been practiced in Africa, Asia, Australia, Polynesia, and South and North America [3]. From the late 19th century onwards, circumcision is seen not only as a cultural or religious practice/identity but also as a public health approach [6]. In the 1980s, observational developed the hypothesis that circumcision might protect against human immunodeficiency virus (HIV) transmission [7, 8].

Male circumcision provides significant protection against HIV transmission and other sexually transmitted infections (STIs) in men [9-15]. This has been proven by randomised controlled trials in South Africa, Kenya, and Uganda [13, 16, 17], showing that circumcised males were less likely to become infected with HIV. As a result, male circumcision is increasingly recommended as a strategy to reduce HIV transmission, particularly in areas with a high prevalence of HIV [18-27]. A World Health Organization and the United Nations report has also highlighted a correlation between the lack of male circumcision and higher HIV rates, specifically in Eastern and Southern Africa [28]. Likewise, some meta-analyses showed that male circumcision protects significantly against HIV infection [29-31]. However, scepticism has also been raised regarding the protective effect of male circumcision on HIV transmission: some previous studies failed to prove the correlation between male circumcision and HIV infection prevention [32, 33], while another study falsely claimed that circumcision increased the risk of HIV transmission [34]. This false claim was strongly criticized as the study used simple data pooling that can lead to incorrect results [35-37]. Such scepticism seems also to be supported by some evidence from Japan and Scandinavian countries showing that the percentage of circumcised men is low, but the prevalence of HIV cases in these counties is also low [38]. However, when it comes to male circumcision and HIV infection in socioeconomically advanced countries, such as Scandinavian countries, as well as others in Europe, the UK, North America, and Australia, male circumcision is protective once sexual practice and sexual activity are taken into account, namely receptive anal intercourse by men who have sex with men (MSM) [39]. This is the primary source of HIV infection in such countries, and male circumcision would have no biological capacity to protect against transmission [39]. Furthermore, factors such as sexually active behaviours prior to

circumcision, religion [40], history of STIs, and age [7] have been reported to be overlooked in the findings of randomised trials. These factors have also been as supporting reasons for doubt about the strength of the relationship between male circumcision and HIV transmission prevention.

Similar to medical circumcision, the protective benefits of traditional male circumcision (TMC) have been a common question. Some evidence has suggested that TMC provides less or no protection from HIV transmission due to less amount of foreskin removed [41-43]. Newly traditionally circumcised males are also considered to have minimal protection if they have sexual intercourse before the wound heals completely [13, 44]. The possibility of acquiring HIV infection through TMC is also considered high due to sharing of a surgical knife or blade on multiple men [23, 45-48]. TMC refers to the procedure of removing the foreskin in males in a non-clinical way by traditional circumcisers without formal medical training [49]. In addition to preparing newly circumcised males for the transition to manhood, TMC symbolises new initiates officially being accepted in the community with a new status of being a man and becoming a good model in family and society [50-52]. TMC also denotes that new initiates have a greater social responsibility to their families and community, act as negotiators in community disputes, and have a chance to learn about the community's problems [18, 19]. These symbolisations highlight TMC as a sacred and secret rite. For example, in Africa, initiates are forbidden to talk with outsiders about the circumcision ritual and those who undergo the ritual as it will cause severe punishment imposed by the community [53, 54]. Similarly, sanctions will be imposed on females and non-circumcised males who gain information about the ritual [55]. To some extent, due to its sacredness, the further consequences of TMC practice have become a challenge for health intervention programs.

Studies on male circumcision and the risk for HIV transmission have been conducted in many parts of the world, including low- and middle-income countries (LMICs) and developed countries. The American Academy of Pediatrics and the US CDC have suggested that the health benefits of male circumcision outweigh the risk [56, 57]. They support parents who approved of infant male circumcision [56] and recommend male circumcision at any age for the health reason. Although TMC is still practised in several countries, and its healing process may have a high risk of HIV and other STIs transmission, to the authors' knowledge, there have been no published systematic reviews on TMC, HIV risk, and impacts on circumcised men and their families. Thus, the authors consider it essential to conduct a systematic review to synthesise evidence and determine whether, in contrast to medical male circumcision, TMC practices may contribute to HIV transmission and what the impacts of TMC are on the initiates, their families and societies. The review was conducted to address these specific questions: how does TMC practice contribute to HIV transmission? What are the implications of TMC on men, their families, and societies? To determine whether a previous systematic review exploring this theme had been completed or is in progress, we conducted a preliminary search in PubMed, CINHAL, and Scopus and found no published systematic reviews or systematic review protocols on this topic in LMICs and developed countries. We also searched the International Register of Systematic Reviews (PROSPERO) to identify underway or protocols of systematic reviews to avoid unintended duplication of reviews. Therefore, this systematic review is needed to fill the gap and to help

inform future health efforts at all levels, including health practitioners, researchers, and policy makers.

2. Methods

2.1 The Systematic Search Strategy

The protocol for the systematic review has been registered with PROSPERO (registration ID: CRD42022357788) [58]. The systematic search started with an initial search following the PICO (Population, Intervention, Comparison and Outcomes) framework, which has been used as part of the WHO guidelines development process to inform evidence-based practice. The systematic search was developed in collaboration with a health librarian expert, and the search terms were adjusted by each database. Databases searched included PubMed, CINHAL, SCOPUS, ProQuest Public Health, Cochrane Library, and Medline Complete - EBSCO. The search was limited to the English language, and with no year limit to capture as many articles as possible about circumcision, traditional male circumcision, HIV, and its impact on men and their families. The search strategies for the databases are in Appendix 1. Medical Subject Headings (MeSH) were used as part of the search strategies. The search terms were formulated using the combination of key terms or the synonym of each concept using boolean terms (OR, AND). In addition to electronic search, Google Scholar and Google were used to search grey literature using key terms, such as traditional male circumcision OR traditional circumcision. Reference lists of all relevant articles were also scrutinised to identify articles not recaptured by electronic database search. The search for databases was conducted from 15 – 30 October 2022. The combination of key terms for electronic database search, including the synonym of each concept, is in table 1.

Table 1. Search terms

Concept and search items
#1. Circumcision OR male circumcision OR traditional circumcision OR traditional initiation OR traditional male initiation OR TMC OR traditional male circumcision OR indigenous male circumcision OR traditionally circumcised OR traditionally circumcised male OR open circumcision OR traditional men circumcision OR sifon OR traditionally circumcised men OR traditionally circumcised husband OR traditional practice of male circumcision OR practice of traditional men circumcision OR ritual traditional circumcision OR ritual initiation
#2. HIV infect* OR HIV prevention OR HIV control OR human immunodeficiency virus OR AIDS OR sexually transmitted infections OR risk of HIV infection OR HIV transmission OR sexually transmitted diseas*
#3. impact* OR psychological wellbeing OR distress OR economic impacts OR social effect OR stigma OR discrimination OR unproductive husband OR loss of job OR loss income OR health impacts OR powerlessness OR worthlessness OR social distance OR social isolation OR stress OR mental health

#4. developing countries OR less developed OR disadvantaged OR resource limited OR poor OR low* OR middle income* OR region* OR area* OR low resource regions OR resource limited regions OR resource limited countr* OR developed countries OR pacific countries
Search combination #1 AND #2 AND #3 AND #4
The search will be applied in different databases: PubMed, CINHAL, SCOPUS, ProQuest, Cochrane database, and Medline.

2.2 Inclusion and Exclusion Criteria

The review included qualitative, quantitative, and mixed-method studies and evidence syntheses (systematic reviews). A summary of inclusion and exclusion criteria is shown in Table 2.

Table 2. Inclusion and exclusion criteria

PICO acronym	Inclusion criteria	Exclusion criteria
P-Population	Young men, young male adults, male adults, mixed participants males and females Studies on TMC involving men living with HIV (married and non-married) Mixed gender (male and female) but with explicit evidence on male	Infant, children, women, female
I- phenomenon of Interest	TMC, HIV transmission and impact	Medical circumcision and its impact and voluntarily medical male circumcision (VMMC)
Co-Context	LMICs and developed countries	
S-Study design	Qualitative, quantitative and mixed method studies. Literature reviews, reports, policy documents,	

	ethnography, anthropology and social study	
Language	English	Other than English
Purpose of study	Studies aiming at exploring the TMC and how it contributes to HIV transmission and the impacts of HIV on circumcised men and their families	Studies aiming at exploring HIV risk factors and impacts on women
Text	Full text available	Only abstract
Year publication	No year limit	

2.3 Data Screening

All the identified articles (Fig. 1) were collated and imported into EndNote X9 (Clarivate Analytics, PA, USA). The search identified 3,041 articles from databases and eight articles from other sources. Duplicates (n=690) were removed using EndNote. The titles and abstracts of the remaining 2,359 articles were screened by the first author and 2,118 articles were removed due to irrelevant populations and focus or aims. In total, 241 articles were examined in full text for eligibility by the first and second authors and disagreements were resolved through discussion among the three authors. Of this, 222 articles were excluded due to not meeting inclusion criteria. Nineteen articles fulfilling inclusion criteria were then assessed for methodological quality using critical appraisal tools developed by the Joanna Briggs Institute (JBI) for study design [59]. This led to the exclusion of one article not meeting the methodological quality, and the remaining 18 articles were included in the final review. The methodological quality assessment was performed by the authors GAA and NKF. Uncertainty was resolved through discussion among the three authors. The screening process of the articles is reported and presented according to the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) flow diagram (Figure 1) [60].

2.4 Data Extraction and Data Analysis

For each included article, data extraction was conducted with an extraction sheet. In the sheet, we recorded (i) study details: the last name of the first author, year of publication, study setting; (ii) study design: type of study, study aim, analysis methods; (iii) characteristics of participants: population, sex of participants, age of respondents; and (iv) results: the main themes, including TMC as a cultural practice, the impact of not being traditionally circumcised and the risk for HIV transmission (Supplementary File 1). The analysis followed three-stage procedures by Thomas and Harden framework [61]: (i) coding the text line by line, interpreting the data, and identifying concepts or themes; (ii) developing descriptive themes by groping similar concepts in theme and sub-theme; and (iii) generating analytical themes by reviewing

preliminary themes and discuss the addition or revision of the themes. The final analytical themes were then reviewed and decided, as presented below.

In general, the quality of methodological assessment of the included studies varied. Among the 18 studies, 5 studies reached 100% in assessment of methodological quality, 8 reached 90%, 4 reached 80%, and 1 reached 70%. The detail of methodological quality assessment can be seen in Supplementary File 2.

2.5 Patient and public involvement

This study used published studies and did not include patients and public involvement.

3. Result

3.1 Characteristics of Included Studies

All included articles were published in English from 2003 to 2020. Among the 18 included publications, 11 were qualitative studies [44, 62-71], 5 were quantitative studies [72-76] and 2 were mixed methods [77, 78]. All the included studies were conducted in areas where traditional male circumcision was performed. A total of 48,468 participants were involved in the review, of whom 1055 and 47,413, respectively, were involved in qualitative and quantitative studies. Eleven studies involved male only [65-70, 73-75, 77, 79], 7 studies involved men and women [44, 62-64, 72, 76, 78], 2 studies involved traditional circumcisers [64, 65], and 1 study involved health practitioners [64]. Participants' age ranged from 13 to 70 years old. Of the 18 studies, 2 did not report the participants' age [62, 66]. Most of the studies (n=17) were conducted in Africa, while 1 was conducted in PNG [62].

Key findings were grouped into three main themes, including (i) TMC as a cultural practice, (ii) TMC and challenges of not being traditionally circumcised on men and family, and (iii) TMC and the risk for HIV transmission. Finally, knowledge gaps were identified.

3.2 TMC As a Cultural Practice

It is widely recognised that TMC is practised by various cultural groups among men as a rite of passage from childhood to adulthood. To the search, TMC is mainly practised in LMICs in Africa and PNG. Thirteen studies [44, 62, 63, 65, 66, 68-71, 76-78, 80] discussed TMC as a cultural practice: the process of TMC, TMC as a secret and sacred practice, and reasons to undergo TMC.

3.2.1 Process of TMC

Of the fourteen studies, seven [62, 63, 65, 66, 69, 70, 78] described three steps of the TMC ceremony, including the separation from family and community, transition, and incorporation into the family and community. In separation step, new initiates were taken to a mountain or camp for weeks or months [66, 78]. This long period was reported to be adequate time for the healing process and learning about manhood [66]. The separation was meant for new initiates to

demonstrate survival skills, such as the ability to endure pain, which could improve men's qualities, such as strength, courage, respect and fortitude [63].

Transition process is a step where initiates were taught about the social norms, cultural knowledge and community expectation for them so that they can socialise with their nuclear family, friends, and community [70]. For example, a study in Papua New Guinea [62] found that new initiates were taught about what they have as a clan, such as their ancestral values and spirit, their clan's history, status, the land, the forest and the sea. Three studies [66, 69, 78] discussed expectations in initiate's families and communities after being traditionally circumcised, which is in line with a study [81] reporting new initiates were expected to be role models, have the ability to protect family, solve family disputes, and refuse tasks considered as a female domain. In the community, they were also expected to have a sense of belonging to the community, take greater responsibilities (avoiding criminal activities and abuse of women), be able to cooperate with elders and have the ability to face difficulties in the future.

In addition to learning about family and community, several studies [70, 78] reported that new initiates were taught about sexuality during the TMC ceremony. A study in Limpopo, South Africa [63] found that sexual socialisation during TMC emphasises on sexual control and sexual reserve rather than "permit to sex." For example, initiates were taught that if they did not wait a long time to have sexual intercourse after being circumcised, their foreskin would grow again, and therefore, they would have to undergo a new circumcision which is more painful [70]. However, other findings [70, 78] discovered that the emphasis on sexuality during circumcision had been changed with circumcision as a "license" for sex, including unsafe sex behaviours. These studies support the findings of another study reporting that traditionally circumcised men tended to assume that they had unlimited and unquestionable rights to have access to sex [81].

The incorporation process was marked by the return of initiates to the family and community. In South Africa [70], upon returning, new initiates wore a new dress code symbolising newly circumcised men reentering family and community as new individuals or transformed individuals who were ready to fulfill new roles in their society. This process is marked with a celebration by slaughtering animals (a goat or a sheep) as a sign of thanks to ancestors, family and community [66]. A study in Papua New Guinea found that incorporation was marked with having a celebration or party with family and community [62]. Celebration of successful traditional circumcision draws the symbolic power of being custodians of cultural practices resulting in the sense of community, social identity, and belonging [65].

Three studies [45, 65, 73] described TMC as an incomplete or partial circumcision, as only part of the foreskin was removed during circumcision. This is usually performed in non-clinical settings by traditional circumcisers without formal medical training. Having a partial foreskin is considered the same as not being circumcised as the foreskin keeps semen in the penis, thus, making them "dirty" and vulnerable to easily being infected with HIV and other STIs infections compared to full circumcision (medical circumcision) [65]. Findings showed that TMC, similar to medical circumcision, may reduce the risk of HIV and other STIs. The findings also showed that

the amount of foreskin removed during the ceremony determines the extent of effectiveness against HIV transmission.

3.2.2 TMC As a Secret and Sacred Practice

Six studies [62, 63, 65, 66, 70, 76] described TMC as a sacred, secret, and compulsory cultural practice in communities. As a sacred and secret practice, TMC was conducted with certain rituals in certain places and performed by certain people (traditional circumcisers). In Tanzania, the traditional circumcisers were appointed by ancestors through dreams, and the skills were passed from one person to another through observation [65]. Meanwhile, in Xhosa, South Africa, the skills were taught by elder circumcisers through apprenticeship [66]. The ritual ceremony was performed by traditional circumcisers or clan leaders prior to circumcision. Similarly, as a compulsory practice, all men within the community were required to undergo such practice. Secretness is also marked by separation or isolation. Studies in Africa found that secretness is kept by isolating or separating new initiates from their families and communities [66, 70]. Similarly, a study in Papua New Guinea [62] found that TMC was performed in a designated home for the exclusive use of men, where only men were allowed to witness the actual process.

The cultural practice of TMC in Africa and Asia does not allow women to be around the ceremony and view or have knowledge of the process of TMC. It is believed that initiates will be affected by witchcraft and experience a slow recovery process if women were present during the ceremony. However, women in Papua New Guinea [62] were found to be highly knowledgeable about the whole process of TMC and able to explain in detail the cutting process, the procedures and the disposal of blood. The role of women in the community in Papua New Guinea was to start preparing for welcoming new initiates, such as making food, buying pigs to be eaten during the celebration, singing, dancing and giving gifts.

The sacredness of the TMC was reported to be related to the initiate's ancestors' intervention, as highlighted in two studies [65, 66]. In South Africa, ancestors were reported to be involved in the TMC process and wound healing following circumcision. Long-healing wounds or not healing correctly is associated with sexual impurity. For example, in Monduli, Tanzania [76], it was believed that the wound took two weeks to be completely healed for initiates who had not engaged in sexual intercourse before circumcision and took more than one month for the exposed ones. Due to this, in certain communities, initiates were asked to repent their sins so that the wound would heal quickly [66].

3.2.3 Reasons to Undergo TMC

Ten studies [44, 62, 65, 66, 68-71, 76, 77] describe rationales for TMC. These studies underlined an obligation to perform cultural rites to prepare new initiates for the responsibility of adulthood as the main reason for TMC. A qualitative study in South Africa [44] found that men and women underlined the importance of TMC to live up to cultural values and community expectations. They believed that traditionally circumcised men were more mature, less abusive, and more

responsible than non-traditional circumcision as they had received teachings during ceremonies. Furthermore, learning social norms, cultural values and men's related values, such as being tough and brave to take risks, were aspects that were only found in traditional circumcision and not in medical circumcision [82]. This reason seemed to influence initiates' resistance to modern medical circumcision. Expecting the privilege of being accepted and being together, such as having meals in the same dishes with the circumcised ones, was also a supporting factor for men to undergo TMC [77].

Four studies [76, 80, 83, 84] described economic reasons to undergo TMC. The low cost of TMC compared to medical circumcision was reported to affect the initiates' and their family's decision [83]. Evidence from South Africa showed that new initiates could not afford to pay for medical circumcision, and the amount of money charged by legal traditional circumcisers resulted in new initiates taking health risks by visiting illegal traditional circumcisers because they charge less [77]. Such evidence seemed to show that people who were economically vulnerable in traditional settings may only be able to access cheaper circumcision services with a high risk of complication and potential risk of HIV transmission. Nevertheless, in many cases, the cost charged for traditional circumcision did not include the time the wound was fully recovered, complications requiring further medical treatment, and celebration of full recovery [80].

Five studies [44, 62, 65, 69, 71] discussed the influence of women (e.g., girlfriends, future wives/partners), family, community and peers on men to undergo circumcision (TMC and medical circumcision). Evidence from South Africa showed that women often scheduled appointment for their boyfriend or husband to be traditionally circumcised [79]. Similarly, another finding in South Africa showed that women tended to undermine the manhood of non-circumcised males [69]. Also, findings in PNG showed that women prefer circumcised men for marriage and as sexual partners [62]. In addition to cultural reasons, women's preferences for circumcised men were related to pleasure and satisfaction during sexual intercourse compared to uncircumcised men [44]. This is in line with other systematic reviews reporting that women prefer circumcised men for multiple reasons, including sexual pleasure [85, 86]. Family, community and peers were also reported as significant influencers for young men to undergo TMC [65].

3.3 TMC and The Consequences of Not Being Traditionally Circumcised on Men and Their Families

Eleven studies [44, 62-65, 67, 68, 70, 72, 76, 87] described the challenges of not being traditionally circumcised, including psychological impacts and social challenges. The details about these aspects are presented below.

3.3.1 Psychological Challenges

Psychological impacts, including feelings of shame, stress, and embarrassment, were common negative challenges experienced by men who were not traditionally circumcised [88]. Such challenges were supported by experiences of being asked by friends about when to undergo TMC [88]. Another stressor for such psychological challenges included feeling obligated to undergo

the ritual. Similarly, uncircumcised men were negatively affected by the community's perception of masculinity and adulthood.

Social pressures associated with traditional circumcision were another stressor for psychological challenges facing young people in some settings. Several studies described African adolescents and young men who experienced social pressure from their family and peers for being medically circumcised and uncircumcised [44, 65]. For example, several men acknowledged that they decided to be traditionally circumcised because their fathers or brothers had undergone circumcision, leading them to feel obligated to undergo the same ritual [70]. Others pointed to the respect for culture or system they grew up with, where all men underwent the same ritual [70]. In the Xhosa community in South Africa, uncircumcised men were often called cowards by friends of the same age [70]. Therefore, the decision to be traditionally circumcised was to avoid being harassed and ridiculed. In the family context, the pressure of young men to be traditionally circumcised stems from the desire to maintain family honour [67].

Another significant pressure was from women. Studies found that boys felt pressure when asked by girlfriends or partners about their circumcision status. A study in South Africa found that girls were undermined if dating and walking with uncircumcised boys [70]. Uncircumcised boys were also considered not ready building relationships with women [67]. Another finding in Africa also showed that circumcision is beneficial for women who were married to men who were cheating, as circumcision might protect against HIV transmission [70].

3.3.2 Social Challenges: Stigma, Discrimination and Disrespect

Seven studies [44, 62, 63, 67, 69, 70, 87] described stigma and discrimination related to TMC. A study in Xhosa, South Africa, noted that 70% of Xhosa initiates felt that they would experience stigmatisation if they were not traditionally circumcised [89]. In the same study setting, uncircumcised men and those who underwent medical circumcision were stigmatised as boys who were immature and impossible to distinguish them from 'real men' [67]. Similarly, uncircumcised men in PNG [62] felt ridiculed, mocked and people made fun of those who were not traditionally circumcised. Indeed, uncircumcised men in PNG are referred to as *utilusa* (foreskin) instead of using their actual name. Such impact was experienced by not only the initiates but also the initiates' families in which others in the community looked down on the initiates' father and family. For young uncircumcised men in Africa, stigma, discrimination, and rejection were reported to have caused long-term psychological effects reflected in anxiety, personality change and lack of confidence [67].

It is also reported that uncircumcised men were treated differently and assumed negatively, as reported in two studies [67, 70]. In the family and community, they were highly vulnerable, often blamed for inappropriate actions and considered incapable of moral worth. For example, uncircumcised men are often accused of being liars and thieves and treated like animals (dogs) in their community [67]. Another Africa study showed that uncircumcised men and those who underwent medical circumcision would not be accepted in the community, did not obtain rights and responsibility in their families, and had no rights to negotiate with elders [70]. Also, they

were not allowed to start families within their community and to inherit and have property on their own [67]. Such negative impacts were reported to affect uncircumcised men psychologically, such as feeling embarrassed, disadvantaged and having low/no moral worth.

A couple of studies also suggested that uncircumcised men who underwent medical circumcision did not earn respect from the community [44, 70]. In some settings , it is considered proper for the community not to respect men who failed to follow the rite of passage, leading them to not receiving the same status as other men [44, 70]. Uncircumcised men and those who failed to follow the ritual would be marginalised from the traditional ceremony and community discussion [67]. These studies suggested that such consequences can lead to further psychological problems, such as sadness, low self-esteem, guilt, social withdrawal and frustration among traditionally uncircumcised men.

The social challenges, stigma, discrimination and expectation towards traditionally circumcised men underline cultural constructions of the penis and body, leading to the construction of masculinity and womanhood, which further raises issues of gender constructions [90]. The body functions metaphorically to symbolise social status, tribal affiliation, family position, and gender [90]. Rite of passage indicated by ritual and social transformation plays significant roles in social interaction within community [90].

3.4 TMC and the Risk for HIV Transmission

Nine studies [44, 63-65, 72, 73, 75, 76, 78] described (i) shared knife and bandage, unhygienic environment and the risk for HIV transmission; (ii) TMC promoted multiple sexual intercourses and increased sex partners, (iii) Belief in the protective effects of TMC against HIV/AIDS, and (iv) TMC and knowledge of HIV transmission.

3.4.1 Shared a Knife and Bandage, Unhygienic Environments and the Risk for HIV Transmission

Four studies [64, 65, 72, 76] highlighted the practice of one knife or blade used to circumcise several initiates. For example, most participants in a study in Tanzania reported that one knife was used in all TMC ceremonies [65]. Similarly, a quantitative study in South Africa showed that using one knife or blade to circumcise several initiates in one or several TMC ceremonies was reported to put initiates at high risk of being infected with HIV and other STIs as some of the initiates may have had unsafe sexual intercourse before circumcision and may already be HIV-positive [72]. However, another finding in a quantitative study [76] showed that some traditional circumcisers started using one knife or razor one for one initiate.

A study by Mpateni and Kang'ethe [64] also highlight the possibility of being infected with HIV and other infectious diseases through sharing bandage and unhygienic environments reflected in contaminated areas around the ceremony and using unwashed dishes to eat. Such poor environments were supported by the careless mistakes of traditional circumcisers who lacked knowledge of the importance of hygiene and how infectious diseases spread.

3.4.2 TMC Promotes Multiple Sexual Intercourses and Increases Sex Partners

Promoting multiple sexual intercourses in TMC was reported in five studies [44, 63, 64, 75, 78]. A qualitative study in Malawi [78] found stakeholders' concern about the role of the TMC ceremony in promoting sexual adventure among new initiates, asserting that circumcised men were not children anymore after they had sexual intercourse following circumcision. Similarly, there was also myths and false teaching that after being traditionally circumcised, initiates had to have sex with several females for testing of the penis [64]. As a result, many boys took this ceremony as a license to start having sex. This finding supports the finding of a study [63] that traditional initiation schools had a strong influence on initiates sexual behaviours. This strong sexual desire was reported to be supported by a considerable amount of time they spent in the bush or camp during TMC ceremonies without any contact with females [44]. Elsewhere, a qualitative study [44] found that traditionally circumcised men were told to have sexual intercourse without condoms to prove that they could enjoy flesh-to-flesh sex following the circumcision. As a result, some initiates continued to not use condoms following TMC.

Promoting sexual intercourse has led traditional initiates to increase the number of sex partners, as reported in two quantitative studies [73, 75]. The study in Kenya found that some initiates had more sexual desire following TMC, resulting in initiates increasing their number of sexual partners. Such practice was reported to increase the transmission of STIs [75]. The study suggests the need for the synergy between traditional rituals and medical intervention for HIV preventive practice.

3.4.3 Belief in the Protective Effects of TMC Against HIV and Condom Use

Belief in the protective effects of TMC against HIV/AIDS transmission was also a risk factor which further affects initiates' sexual behaviours. Four studies [70, 74, 75, 91] discussed about beliefs in the protective effects of TMC. Traditionally circumcised men tended to believe that TMC offers complete protection against HIV and other STIs and that circumcision is an alternative to condom use [91]. A quantitative study in Eastern Cape, South Africa, found that 97% of TMC initiates believed that TMC made initiates become 'real men' and did not need to use condoms during sexual intercourse [75]. A study in Sub-Saharan African countries [73] found that traditionally circumcised males were less likely to use condoms following circumcision. This is similar to Eastern Cape findings [74], reporting that TMM initiates were more likely to engage in risky sexual activities. Similarly, a cohort study in South Africa [75] found that 38% of traditionally circumcised men reported inconsistent condom use when having sex, and 8% reported never using condoms.

3.4.4 TMC and Knowledge of HIV Transmission

Lack of knowledge of HIV and other STIs among initiates and traditional circumcisers was reported in five studies [63-65, 73, 75]. Similar to medical circumcision, TMC initiates also believed that TMC protected them from STIs such as syphilis and gonorrhoea and enhanced

personal hygiene [65]. A cohort study [75] found that new initiates who went through traditional circumcision were mainly for cultural reasons rather than HIV prevention.

The absence of information about HIV and other STIs prior to and after the circumcision was also reported as an HIV risk factor. For example, a study in Limpopo [63] found that traditional initiation schools did not provide information about sexual health and HIV/AIDS and other STIs but tended to encourage new initiates to engage in risky sexual activities. Safer sexual behaviours, such as condom use and being faithful to one sex partner, were not considered a part of initiation school programs. This was acknowledged by initiates, who said that they obtained information about condoms from local clinics and mass media [63]. A qualitative study in South Africa [70] found that the absence of information has led to a lack of understanding about the correlation between circumcision and HIV transmission.

Lack of knowledge of the mode of HIV transmission was not only in TMC initiates but also among traditional circumcisers, reflected in encouraging sex adventure, using one knife for several initiates, sharing bandages for several initiates, and ignorance of unhygienic environments [64]. A study in Tanzania [76] revealed that most traditional circumcisers did not associate traditional circumcision practice and HIV/AIDS, assuming that HIV/AIDS was an urban disease. However, another finding of the same study also showed that careless mistakes performed by traditional circumcisers by not using any protection, such as gloves, when cutting the foreskin of the penis increased the risk of HIV transmission.

4. Discussion

4.1 TMC Practices and HIV Transmission

The findings show evidence that TMC as a cultural practice remains practised in some communities in LMICs in Africa and Asia. The majority of the studies [44, 62-66, 68-71, 76-78, 80] reported that TMC in communities is not merely to cut off the foreskin but also to live up the tradition, keep the relationship with their ancestors, and to teach and inherit cultural values and the values of 'manhood' to new initiates. The practice of TMC is highly valued as a secret and sacred practice, taking weeks and months from the separation step until the new initiates return to the families and communities. Secretness and sacredness aspects in TMC may have led to difficulties in health intervention to control safety procedures. Such practice and its potential health risk factors reflect the community's high value on culture or tradition rather than any other type of medical or modern health intervention.

Studies in many Africa communities found that TMC is a compulsory practice where all men were required to be traditionally circumcised, leaving challenges at individual and family levels for those who did not undergo such practice. At the individual level, TMC causes psychological impacts for uncircumcised men and those who followed medical circumcision, including feeling ashamed, stressed, and pressured. These impacts were supported by the cultural values that put TMC as a standard of maturity for men. In addition to experiencing pressure from family and community, uncircumcised men also felt pressure from girls or women who preferred to build a relationship or to have sexual intercourse with traditionally circumcised men [44, 62, 65, 69].

Such impacts were also attributed to those who did not completely follow the process of TMC or mixed with medical circumcision. Although studies included in this review did not report the challenges of TMC on families, it is plausible to argue that family would be impacted if young men within the family did not undergo TMC.

Not undergoing TMC could also lead to negative social challenges such as stigma, discrimination, and disrespect towards men [63, 67, 87]. For example, those who did not undergo TMC could be labelled immature, irresponsible and easily ridiculed, humiliated, and mocked. Traditionally uncircumcised men were stigmatised in families and communities as the cause of any crime or irresponsible actions. Similarly, they did not have full rights to discuss and negotiate with elders about families' and communities' problems. They are labelled and treated without respect (e.g., like a dog), implying that they are considered less than human. Such impacts are in line with the components of stigma, such as labelling human differences, hegemony of cultural practices associated labelled persons to undesirable characteristics, labelled persons being separated with the term "us" and "them", labelled persons experiencing loss of status and discrimination, and labelled persons experiencing difficulties in access to social, economic and political power [67, 92]. Similar to psychological impacts, all the studies included in the review mainly focus on stigma on initiates and thus less concern on stigma on the family. Stigma, discrimination, and disrespect experienced by initiates prior to circumcision and uncircumcised men also reflect a lack of social and psychological support from their families, friends, and communities.

TMC is generally assumed to have implications for HIV transmission [44, 63, 64, 72, 73, 75, 76, 78]. The unsafe procedure of TMC practices, such as using one knife to circumcise several initiates, not wearing gloves when circumcising initiates, and unhygienic environments, raise the concern of on potential spread of infectious diseases, including HIV [64, 72, 76]. In addition, to learn about culture and manhood in the transition period, initiates were also taught about exploring their sexuality, leading initiates to consider TMC as a 'gateway' to have unquestionable sex adventures and more than one sexual partner. For example, initiates were asked to have sexual intercourse with women who had sex before as reported in a previous study. For example, initiates were suggested to have sexual intercourse with women who have had sex before, which is in line with another study [93] reporting that initiates were required to have sexual intercourse without protection several days before the wound heals as a way to speed up the recovery process The correlation between TMC and the risk of HIV transmission is also related with the belief that TMC has the same protective effects as using a condom. This belief may also be supported by the sacredness aspect of the TMC rite, believing that the dead ancestors will intervene in the health of the initiates, as in line with previous studies [62, 76]. Another supporting factor for TMC and the risk of HIV transmission is the lack of knowledge on the mode of HIV transmission. In some communities, safe sexual behaviour was not part of the subjects taught during the TMC rite, leading initiates to not know HIV risk. This is in line with a finding in another study among 100 participants, of whom 67% were unaware of the risk of traditional circumcision for HIV transmission [94]. However, the risks for HIV transmission were also reported among initiates who knew about HIV transmission. Findings of a previous study suggest that circumcised men who had knowledge about HIV preventive measures of male circumcision and believed that male circumcision could reduce the risk of HIV infection were more likely to

engage in risky sexual behaviours or sex without condoms with multiple partners [95]. The risks for HIV transmission in the practice of TMC reflect a lack of education, public awareness campaigns and counseling for young men, parents, students, local leaders, and traditional circumcisers in the community practising TMC.

4.2 Implications for Future Intervention

The systematic review provides a range of negative impacts of not being traditionally circumcised on men and scant information about the effects on their families. Overall, the studies highlight psychological and social challenges that need to be addressed in communities practicing TMC. The studies also highlight TMC and the risk for HIV transmission, which require future health interventions.

This review shows that stigma, discrimination, and disrespect towards uncircumcised men or those who followed medical circumcision were within initiates' families and communities. This is because TMC is viewed as more prestigious than any other circumcision. It is suggested to have continuous counselling, approach, and education in communities where traditional beliefs and norms are still highly valued [63]. These approaches should reach families, communities and schools. In light of the TMC and the risk for HIV transmission, it is noted that in some communities, TMC has no role to play in preventing HIV and other STIs transmission, such as promoting multiple sexual intercourses, not using condoms, and believing the complete protection of circumcision against HIV transmission. To address this problem, education to target traditional circumcisers, traditional leaders, parents, and young men is required to improve the safe practice and prevent HIV transmission as reported in several studies [63, 80, 96]. Similarly, education on condom use and free, accessible condoms should also reach the camps where TMC practices were performed [63]. In addition, service delivery on providing free HIV testing for initiates in communities practicing TMC is needed.

4.3 Strengths and Limitations of the Study

Although many studies on male circumcision have been conducted mainly in Africa and some in Asia, this review is, as far as the researchers know, the first known study on TMC, the risk for HIV transmission and its impacts on them and their families. The use of six databases and multiple search terms helped the researchers conduct a comprehensive systematic review of the literature and provided a broad range of studies in LMICs. The inclusion of qualitative, quantitative, and mixed-method studies helps the researchers collate the current knowledge and identify knowledge gaps on the risk factors and impact of TMC on men and their families. Finally, the study selection methods and the appraisal process provided substantial evidence supporting the key findings reported in the literature review. However, the literature review only included articles published in English which may have narrowed the scope, and the authors may have missed the topic reported in other languages.

4.4 Implications for Future Studies

The literature review documents evidence and knowledge gaps about TMC, HIV risk, and its impact on men and their families. The literature review suggests that the previous studies mainly focus on the correlation between TMC and the risk for HIV transmission; none has explored TMC, HIV risk and its impacts on men and their families and none involved traditionally circumcised men living with HIV. Similarly, most included studies were in African settings, and only one was in PNG. Exploring TMC practice in different settings other than in Africa can help understand the similarities and differences of TMC practices and the implication of HIV transmission and its impact on men and their families. The review found very limited number of studies involved wives of married men who have done traditional circumcision and women that have unprotected sexual intercourse with newly traditionally circumcised men to explore their views and sexual practices about TMC. Furthermore, none of the included studies explored the views of health professionals and policy makers on TMC, its possible adverse health consequences and how these have been addressed at the policy level. Also, very limited studies explore traditional circumcisers' views on TMC and HIV risk. Future studies are required to fill these knowledge gaps, which may provide useful information for developing specific interventions for safer TMC and preventing HIV and other STIs transmission.

5. Conclusion

The review presents three main themes: TMC as a cultural practice, the consequences of not being traditionally circumcised, and the TMC-related risk of HIV transmission. These themes provide evidence that TMC and HIV risk could bring significant and negative challenges for men and their families. This review may be useful in designing programs to address social and psychological impacts associated with TMC practice in communities and supports the integration of health intervention with medical circumcision.

Contributors
Conceptualisation and the development of the protocol, Gregorius Abanit Asa (GAA), Nelsensius Klau Fauk (NKF), and Paul Russell Ward (PRW); Methodology, GAA, NKF and PRW; systematic search of the literature, GAA and NKF; formal analysis, GAA; writing-original draft preparation, GAA; writing-review and editing, GAA, NKF, and PRW; supervision, GAA, NKF, and PRW. All authors have read and agreed to the published version of the manuscript.

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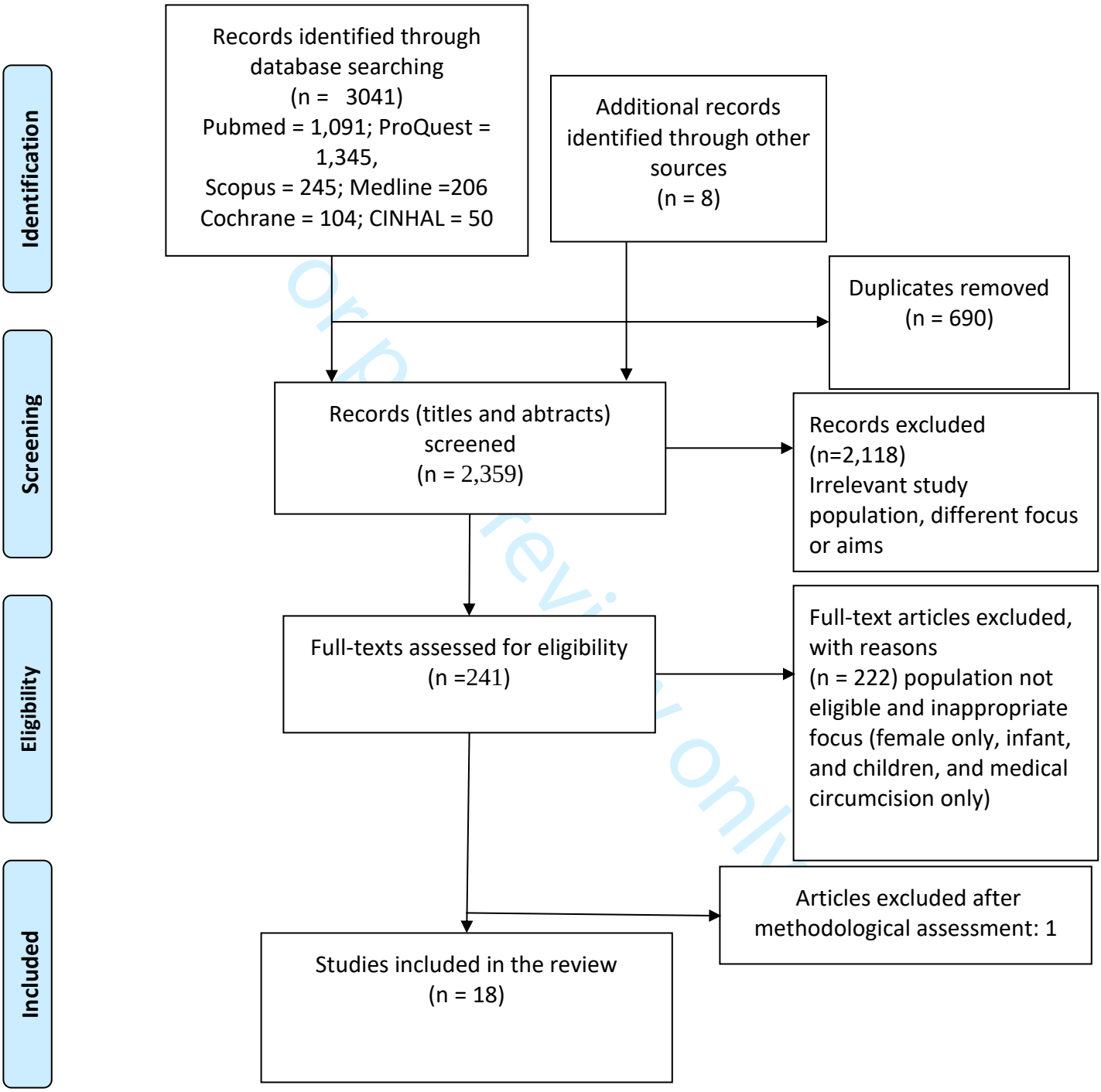
Figure 1: PRISMA Flow diagram of systematic literature search: records identified, removed, screened, and included in the review.



Appendix 1

Cochrane Database

ID	SEARCH	RESULT
#1	(Circumcision):ti,ab,kw	823
#2	(male circumcision):ti,ab,kw	644
#3	(Traditional circumcision):ti,ab,kw	28
#4	(traditional initiation):ti,ab,kw	530
#5	(traditional male initiation):ti,ab,kw	215
#6	(TMC):ti,ab,kw	153
#7	(traditional male circumcision):ti,ab,kw	22
#8	(indigenous male circumcision):ti,ab,kw	0
#9	(traditionally circumcised):ti,ab,kw	7
#10	(traditionally circumcised male):ti,ab,kw	7
#11	(open circumcision):ti,ab,kw	37
#12	(traditional men circumcision):ti,ab,kw	4
#13	(sifon):ti,ab,kw	1
#14	(traditionally circumcised men):ti,ab,kw	7
#15	(traditionally circumcised husband):ti,ab,kw	0
#16	(traditional practice of male circumcision):ti,ab,kw	4
#17	(practice of traditional men circumcision):ti,ab,kw	0
#18	(ritual traditional circumcision):ti,ab,kw	1
#19	(ritual initiation):ti,ab,kw	4
#20	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19	1,505
#21	(HIV infect*):ti,ab,kw	22,735
#22	(HIV prevention):ti,ab,kw	7,379
#23	(HIV control):ti,ab,kw	9,181
#24	(human immunodeficiency virus):ti,ab,kw	13,087
#25	(AIDS):ti,ab,kw	11,037
#26	(sexually transmitted infections):ti,ab,kw	1,782
#27	(risk of HIV infection):ti,ab,kw	4,161
#28	(HIV transmission):ti,ab,kw	2,970
#29	(sexually transmitted diseas*):ti,ab,kw	2,307
#30	#21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29	34,349
#31	(impact*):ti,ab,kw	140,990
#32	(psychological wellbeing):ti,ab,kw	7,265
#33	(distress):ti,ab,kw	24,913
#34	(economic impacts):ti,ab,kw	481

#35	(social effect):ti,ab,kw	18,607
#36	(stigma):ti,ab,kw	2,829
#37	(discrimination):ti,ab,kw	6,029
#38	(unproductive husband):ti,ab,kw	0
#39	(loss of job):ti,ab,kw	274
#40	(loss income):ti,ab,kw	717
#41	(health):ti,ab,kw	275,486
#42	(powerlessness):ti,ab,kw	55
#43	(worthlessness):ti,ab,kw	48
#44	(social distance):ti,ab,kw	1,128
#45	(social isolation):ti,ab,kw	1,536
#46	(stress):ti,ab,kw	69,129
#47	(mental health):ti,ab,kw	36,701
#48	#31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47	440,867
#49	(Developing countries):ti,ab,kw	4,556
#50	(less developed):ti,ab,kw	11,004
#51	(disadvantaged):ti,ab,kw	1,475
#52	(resource limited):ti,ab,kw	2,307
#53	(poor):ti,ab,kw	47,530
#54	(low*):ti,ab,kw	444,090
#55	(middle income*):ti,ab,kw	4,451
#56	(region*):ti,ab,kw	57,105
#57	(area*):ti,ab,kw	125,969
#58	(low resource regions):ti,ab,kw	86
#59	(resource limited regions):ti,ab,kw	62
#60	(resource limited countr*):ti,ab,kw	603
#61	(pacific countries):ti,ab,kw	206
#62	(developed countries):ti,ab,kw	3,507
#63	#49 OR #50 OR #51 OR #52 OR #53 OR #54 OR #55 OR #56 OR #57 OR #58 OR #59 OR #60 OR #61 OR #62	604,139
#64	**#20 AND #30 #48 AND #63**	**104**

Pubmed

ID	Search	Result
#1	Circumcision	9,524
#2	Male circumcision	7,140
#3	Traditional circumcision	724
#4	Traditional initiation	25,522

#5	Traditional male initiation	7,538
#6	TMC	18,118
#7	Traditional male circumcision	433
#8	Indigenous male circumcision	18
#9	Traditionally circumcised	104
#10	Traditionally circumcised male	85
#11	Open circumcision	189
#12	Traditional men circumcision	132
#13	Sifon	6
#14	Traditionally circumcised men	46
#15	Traditionally circumcised husband	3
#16	Traditional practice of male circumcision	231
#17	Practice of traditional men circumcision	89
#18	Ritual traditional circumcision	81
#19	Ritual initiation	376
#20	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19	53,328
#21	HIV infect*”	321, 398
#22	HIV prevention	110,968
#23	HIV control	118,789
#24	human immunodeficiency virus	414,981
#25	AIDS	295,363
#26	sexually transmitted infections	382,177
#27	risk of HIV infection	91,619
#28	HIV transmission	61,338
#29	sexually transmitted diseas*	47,282
#30	#21 OR #22 OR 23 #24 OR #25 OR #26 OR #27 OR #28 OR #29	606,521
#31	impact*	1,451,654
#32	psychological wellbeing	40,200
#33	distress	173,116
#34	economic impacts	134,222
#35	social effect	373,469
#36	stigma	35,752
#37	discrimination	328,352
#38	unproductive husband	3
#39	loss of job	3,248
#40	loss income	7,152
#41	health	5,932,617
#42	powerlessness	2,188
#43	worthlessness	907
#44	social distance	18,568

#45	social isolation	41,345
#46	stress	1,181,113
#47	mental health	471,114
#48	#31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47	8,094,384
#49	Developing countries	152,805
#50	less developed	397,001
#51	disadvantaged	115,498
#52	resource limited	112,693
#53	poor	753,973
#54	low*	2,817,510
#55	middle income*	78,651
#56	region*	2,238,390
#57	area*	1,819,969
#58	low resource regions	41,929
#59	resource limited regions	46,087
#60	resource limited countr*	17,754
#61	pacific countries	8,089
#62	developed countries	100,459
#63	#49 OR #50 OR #51 OR #52 OR #53 OR #54 OR #55 OR #56 OR #57 OR #58 OR #59 OR #60 OR #61 OR #62	7,164,066
#64	**#20 AND #30 AND #48 AND #63**	**1,091**

CINHAL (15/9/2022)

ID	Data search	Result
S1	Circumcision	2,744
S2	male circumcision	1,799
S3	traditional circumcision	69
S4	Traditional initiation	62
S5	Traditional male initiation	5
S6	TMC	279
S7	Traditional male circumcision	25
S8	Indigenous male circumcision	1
S9	Traditionally circumcised	15
S10	Traditionally circumcised male	3
S11	Open circumcision	2
S12	Traditional men circumcision	8
S13	Sifon	3
S14	Traditionally circumcised men	8

S15	Traditionally circumcised husband	28
S16	Traditional practice of male circumcision	4
S17	Practice of traditional men circumcision	863
S18	Ritual traditional circumcision	2
S19	Ritual initiation	14
S20	Circumcision OR male circumcision OR traditional circumcision OR traditional initiation OR traditional male initiation OR TMC OR traditional male circumcision OR indigenous male circumcision OR traditionally circumcised OR traditionally circumcised male OR open circumcision OR traditional men circumcision OR sifon OR traditionally circumcised men OR traditionally circumcised husband OR traditional practice of male circumcision OR practice of traditional men circumcision OR ritual traditional circumcision OR ritual initiation	3,085
S21	HIV infect*	90,037
S22	HIV prevention	26,675
S23	HIV control	24,023
S24	human immunodeficiency virus	126,951
S25	AIDS	72,540
S26	sexually transmitted infections	14,067
S27	risk of HIV infection	9,134
S28	HIV transmission	14,251
S29	sexually transmitted diseas*	17,446
S30	HIV infect* OR HIV prevention OR HIV control OR human immunodeficiency virus OR AIDS OR sexually transmitted infections OR risk of HIV infection OR HIV transmission OR sexually transmitted diseas*	175,524
S31	impact*	459,260
S32	psychological wellbeing	1,672
S33	distress	69,006
S34	economic impacts	6,098
S35	social effect	11,476
S36	stigma	28,392
S37	discrimination	39,690
S38	unproductive husband	1
S39	loss of job	1,187
S40	loss income	686
S41	Health impacts	44,686
S42	powerlessness	1,623
S43	worthlessness	228
S44	social distance	973
S45	social isolation	13,906
S46	stress	244,267

S47	mental health	180,215
S48	impact* OR psychological wellbeing OR distress OR economic impacts OR social effect OR stigma OR discrimination OR unproductive husband OR loss of job OR loss income OR health impacts OR powerlessness OR worthlessness OR social distance OR social isolation OR stress OR mental health	916,125
S49	Developing countries	32,517
S50	less developed	1,705
S51	disadvantaged	9,081
S52	resource limited	10,721
S53	poor	167,926
S54	low*	898,051
S55	middle income*	15,462
S56	region*	206,608
S57	area*	361,412
S58	low resource regions	39
S59	resource limited regions	119
S60	resource limited countr*	982
S61	pacific countries	580
S62	developed countries	13,338
S63	S49 OR S50 OR S51 OR S52 OR S53 OR S54 OR S55 OR S56 OR S57 OR S58 OR S59 OR S60 OR S61 OR S62	1,448,156
S64	(Circumcision OR “male circumcision” OR “traditional circumcision” OR “traditional initiation” OR “traditional male initiation” OR TMC OR “traditional male circumcision” OR “indigenous male circumcision” OR “traditionally circumcised” OR “traditionally circumcised male” OR “open circumcision” OR “traditional men circumcision” OR sifon OR “traditionally circumcised men” OR “traditionally circumcised husband” OR “traditional practice of male circumcision” OR “practice of traditional men circumcision” OR “ritual traditional circumcision” OR “ritual initiation”) AND (“HIV infect*” OR “HIV prevention” OR “HIV control” OR “human immunodeficiency virus” OR AIDS OR “sexually transmitted infections” OR “risk of HIV infection” OR “HIV transmission” OR “sexually transmitted diseas*”) AND (“impact*” OR “psychological wellbeing” OR distress OR “economic impacts” OR “social effect” OR stigma OR discrimination OR “unproductive husband” OR “loss of job” OR “loss income” OR “health impacts” OR powerlessness OR worthlessness OR “social distance” OR “social isolation” OR stress OR “mental health”) AND (“developing countries” OR “less developed” OR disadvantaged OR “resource limited” OR poor OR low* OR	50

	"middle income*" OR region* OR area* OR "low resource regions" OR "resource limited regions" OR "resource limited countr*" OR "developed countries" OR "pacific countries")	

Medline (15/09/22)

ID	Key Search	Result
S1	Circumcision	9,374
S2	male circumcision	6,065
S3	traditional circumcision	195
S4	Traditional initiation	165
S5	Traditional male initiation	12
S6	TMC	2,949
S7	Traditional male circumcision	61
S8	Indigenous male circumcision	2
S9	Traditionally circumcised	23
S10	Traditionally circumcised male	6
S11	Open circumcision	14
S12	Traditional men circumcision	12
S13	Sifon	5
S14	Traditionally circumcised men	13
S15	Traditionally circumcised husband	63
S16	Traditional practice of male circumcision	14
S17	Practice of traditional men circumcision	3,083
S18	Ritual traditional circumcision	8
S19	Ritual initiation	43
S20	Circumcision OR male circumcision OR traditional circumcision OR traditional initiation OR traditional male initiation OR TMC OR traditional male circumcision OR indigenous male circumcision OR traditionally circumcised OR traditionally circumcised male OR open circumcision OR traditional men circumcision OR sifon OR traditionally circumcised men OR traditionally circumcised husband OR traditional practice of male circumcision OR practice of traditional men circumcision OR ritual traditional circumcision OR ritual initiation	12,495
S21	HIV infect*	270,768
S22	HIV prevention	30,071
S23	HIV control	15,837
S24	human immunodeficiency virus	113,022
S25	AIDS	299,295

S26	sexually transmitted infections	36,312
S27	risk of HIV infection	14,681
S28	HIV transmission	22,859
S29	sexually transmitted diseas*	45,085
S30	HIV infect* OR HIV prevention OR HIV control OR human immunodeficiency virus OR AIDS OR sexually transmitted infections OR risk of HIV infection OR HIV transmission OR sexually transmitted diseas*	509,496
S31	impact*	1,446,702
S32	psychological wellbeing	2,963
S33	distress	162,321
S34	economic impacts	22,060
S35	social effect	27,700
S36	stigma	36,196
S37	discrimination	168,953
S38	unproductive husband	3
S39	loss of job	2,135
S40	loss income	1,788
S41	Health impacts	107,509
S42	powerlessness	1,391
S43	worthlessness	456
S44	social distance	4,093
S45	social isolation	24,605
S46	stress	1,141,833
S47	mental health	396,591
S48	impact* OR psychological wellbeing OR distress OR economic impacts OR social effect OR stigma OR discrimination OR unproductive husband OR loss of job OR loss income OR health impacts OR powerlessness OR worthlessness OR social distance OR social isolation OR stress OR mental health	3,099,234
S49	Developing countries	146,228
S50	less developed	10,682
S51	disadvantaged	16,667
S52	resource limited	34,488
S53	poor	699,351
S54	low*	4,964,973
S55	middle income*	35,250
S56	region*	2,226,728
S57	area*	1,811,466
S58	low resource regions	164
S59	resource limited regions	561
S60	resource limited countr*	3,538

S61	pacific countries	1,961
S62	developed countries	67,110
S63	developing countries OR less developed OR disadvantaged OR resource limited OR poor OR low* OR middle income* OR region* OR area* OR low resource regions OR resource limited regions OR resource limited countr* OR developed countries OR pacific countries	8,482,340
S64	(Circumcision OR male circumcision OR traditional circumcision OR traditional initiation OR traditional male initiation OR TMC OR traditional male circumcision OR indigenous male circumcision OR traditionally circumcised OR traditionally circumcised male OR open circumcision OR traditional men circumcision OR sifon OR traditionally circumcised men OR traditionally circumcised husband OR traditional practice of male circumcision OR practice of traditional men circumcision OR ritual traditional circumcision OR ritual initiation) AND (HIV infect* OR HIV prevention OR HIV control OR human immunodeficiency virus OR AIDS OR sexually transmitted infections OR risk of HIV infection OR HIV transmission OR sexually transmitted diseas*) AND (impact* OR psychological wellbeing OR distress OR economic impacts OR social effect OR stigma OR discrimination OR unproductive husband OR loss of job OR loss income OR health impacts OR powerlessness OR worthlessness OR social distance OR social isolation OR stress OR mental health) AND (developing countries OR less developed OR disadvantaged OR resource limited OR poor OR low* OR middle income* OR region* OR area* OR low resource regions OR resource limited regions OR resource limited countr* OR developed countries OR pacific countries)	206

Scopus (13/9/2022)

(TITLE-ABS-KEY (circumcision OR "male circumcision" OR "traditional circumcision" OR "traditional initiation" OR "traditional male initiation" OR tmc OR "traditional male circumcision" OR "indigenous male circumcision" OR "traditionally circumcised" OR "traditionally circumcised male" OR "open circumcision" OR "traditional men circumcision" OR sifon OR "traditionally circumcised men" OR "traditionally circumcised husband" OR "traditional practice of male circumcision" OR "practice of traditional men circumcision" OR "ritual traditional circumcision" OR "ritual initiation")) AND (TITLE-ABS-KEY ("HIV infect*" OR "HIV prevention" OR "HIV control" OR "human immunodeficiency virus" OR aids OR "sexually transmitted infections" OR "risk of HIV infection" OR "HIV transmission" OR "sexually transmitted diseas*")) AND (TITLE-ABS-KEY ("impact*" OR "psychological

wellbeing" OR distress OR "economic impacts" OR "social effect" OR stigma OR discrimination OR "unproductive husband" OR "loss of job" OR "loss income" OR "health impacts" OR powerlessness OR worthlessness OR "social distance" OR "social isolation" OR stress OR "mental health")) AND (TITLE-ABS-KEY ("developing countries" OR "less developed" OR disadvantaged OR "resource limited" OR poor OR low* OR "middle income*" OR region* OR area* OR "low resource regions" OR "resource limited regions" OR "resource limited countr*" OR "developed countries" OR "pacific countries"))

Result: 245

Proquest (15/09/2022)

noft(Circumcision OR “male circumcision” OR “traditional circumcision” OR “traditional initiation” OR “traditional male initiation” OR TMC OR “traditional male circumcision” OR “indigenous male circumcision” OR “traditionally circumcised” OR “traditionally circumcised male” OR “open circumcision” OR “traditional men circumcision” OR sifon OR “traditionally circumcised men” OR “traditionally circumcised husband” OR “traditional practice of male circumcision” OR “practice of traditional men circumcision” OR “ritual traditional circumcision” OR “ritual initiation”) AND (“HIV infect*” OR “HIV prevention” OR “HIV control” OR “human immunodeficiency virus” OR AIDS OR “sexually transmitted infections” OR “risk of HIV infection” OR “HIV transmission” OR “sexually transmitted diseas*”) AND (“impact*” OR “psychological wellbeing” OR distress OR “economic impacts” OR “social effect” OR stigma OR discrimination OR “unproductive husband” OR “loss of job” OR “loss income” OR “health impacts” OR powerlessness OR worthlessness OR “social distance” OR “social isolation” OR stress OR “mental health”) AND (“developing countries” OR “less developed” OR disadvantaged OR “resource limited” OR poor OR low* OR “middle income*” OR region* OR area* OR “low resource regions” OR “resource limited regions” OR “resource limited countr*” OR “developed countries” OR “pacific countries”)

Result: 1345

Supplementary File 1

Author/year	Study Location	Study Design/Study Aim	Number/Age of Participants	Analysis	Main Themes of TMC, HIV risk, Impacts on Men and Their Families
Douglas, et al., 2018 [1]	Eastern Cape, South Africa	(i) Mixed method design (ii) Methods: • Cross-sectional survey • Focus group discussion (FDG) (iii) Aim: • to describe social determinants and explore economic determinants related to traditional circumcision of boys from 12 to 18 years of age in Libode rural communities in Eastern Cape Province	(i) Number of participants • 1036 men (ii) Participant age • 12-18 years old	Thematic analysis Descriptive statistics	**TMC and HIV risk** (i) TMC • TMC as a cultural practice • Reasons to undergo TMC (ii) HIV Risk • Initiates have no knowledge on TMC and HIV transmission • Initiates have no opportunities to talak about TMC and HIV risks
Greely, 2013 [2]	South Africa	(i) Qualitative design (ii) Method: FGD (iii) Aim: • to understand the importance of male circumcision as a risk-reducing strategy by exploring perceptions of young men and women	(i) Number of participants • 15 participants (10 men and 5 women) (ii) Participant age • 15 years and above	Thematic Analysis	**TMC, HIV risk, impacts on men and their families** (i) TMC • TMC as a rite of passage to adulthood • TMC defines being a 'real' man • Traditional initiates receive teaching and guidance from elders • Initiates received more respects • To fulfill or live up to cultural expectations (ii) HIV risk • Initiates were taught to have sexual intercourse • Initiates were keen to prove manhood with unprotective sex intercourse

					• The belief that TMC reduced risk of HIV transmission (iii) Impacts • Uncircumcised men were subject to stigma, discrimination, and disrespect • Uncircumcised men were haunted by bad luck • Women believed traditionally circumcised men are more responsible and less abusive
Gwata, 2009 [3]	Xhosa, South Africa	(i) Qualitative design (ii) Method: interview (iii) Aim • to explore the socio-cultural perceptions of Xhosa-speaking men on traditional male circumcision	(i) Number of participants • 5 men (ii) Participant age • 19-30 years	Thematic analysis	**TMC and HIV risk** (i) TMC • TMC as an agent of socialization within community • TMC tests man's ability to endure pain • Initiates experienced social pressure to undergo TMC (ii) HIV risk • Lack of knowledge on TMC and HIV transmission •
Kelly, et al., 2012 [4]	Papua New Guinea	(i) Qualitative design (ii) Method: • interview and FGD (iii) Aim • to map contemporary MC and other penile cutting practices, and the socio-cultural dimensions underpinning these practices	(i) Number of participants • 276 men (51 men underwent TMC) • 210 women (ii) Participant age Not reported	Thematic analysis	**TMC, HIV risk, impacts on men and their families** (i) TMC • TMC is a compulsory practice • TMC is sacred and secret practice (ii) HIV risk • Reusing of non-sterile cutting equipment • Lack of knowledge of risk of non-sterile equipment and HV transmission (iii) Impacts

					• Uncircumcised men felt stigmatized, ridiculed, and mocked • Family members of uncircumcised men were looked down within the community
Lagarde, et al., 2003 [5]	South Africa	(i) Quantitative design: • cross sectional study (ii) Aim • to measure the prevalence and associated factors of MC in a South African township, and to assess its acceptability as a tool for HIV prevention	(i) Number of participants • 482 men (108 underwent TMC) and 302 women (ii) Participant age • 19-29 years	Multivariate analysis	**HIV risk and impacts on men** (i) HIV risk • Circumcised men did not need to use condoms • The belief that TMC protected against HIV transmission • Initiates had sex during healing period (ii) Impacts • TMC proved manhood Initiates obtained respect from peers and women
Malisha et al., 2008 [6]	Limpopo, South Africa	(i) Qualitative design (ii) Method: interview (iii) Aim • to investigate the role and significance of traditional initiation schools from the perspectives of young people in Venda, a part of South Africa where initiation schools, for some young people, still form an important part of the rite of passage to adulthood.	(i) Number of participants • 17 men and 17 women (ii) participant age • 13-20 years	Thematic analysis	**TMC, HIV risk and impacts on men** (i) TMC • TMC prepares initiates to be a 'real' man • Initiation school is important for socialization (ii) HIV risk • Initiation schools encouraged initiates to engage in sexual activities • Lack of information on HIV and condom use during initiation school • Initiates engaged in sexual intercourse without a condom • Traditional healers did not use sterilised equipment. (iii) Impacts

					• Uncircumcised men experienced rejection • Uncircumcised men were considered not a 'real' man, irresponsible
Mavundla, et al., 2009 [7]	Xhosa, South Africa	(i) Qualitative design (ii) Method: interview (iii) Aim • to explore and describe Xhosa beliefs and practices regarding cultural male circumcision ritual in the Eastern Cape Province in South Africa to support nurses in providing culturally competent care	(i) Number of participants • 25 men (ii) participant age • Not reported	Thematic analysis	**TMC and impacts on men** (i) TMC • Process of TMC • TMC as a sacred and secret cultural practice • TMC did not allow initiates to seek for medical treatment • Expectation following being traditionally circumcised • TMC connects initiates with ancestors (ii) impacts • Uncircumcised men experienced rejection and negative labeling • Circumcised men obtained respect
Mavundla, et al., 2010 [8]	East London, South Africa	(i) Qualitative design (ii) Method: interview (iii) Aim • to describe the experience of newly initiated Xhosa men in East London, South Africa	(i) Number of participants • 14 men (ii) participant age • 15-20 years	Thematic analysis	**TMC and impacts on men** (i) TMC • TMC as a cultural practice (ii) impacts • Uncircumcised men experienced stigma rejection by family, community, peers, opposite sex • Uncircumcised men experienced lack of respect
Mboera et al., 2009 [9]	Tanzania	(i) Quantitative design: • Cross sectional study (ii) Aim • to underscore challenges and opportunities for the involvement of traditional	(i) Number of participants • 324 men and 277 women (ii) participant age • 12-45 years	Thematic analysis	**TMC, HIV risk, and impacts on men and their families** (i) TMC • TMC as a cultural practice • Reasons to undergo TMC (ii) HIV risk

		practitioners in scaling up safe male circumcision as a measure to support global efforts of preventing HIV transmission			• Using the same knife to circumcise several initiates • Lack of knowledge of the possibility of HIV transmission through TMC (iii) impacts • Uncircumcised men were segregated by community • Uncircumcised men experienced lack of respect •
Mpateni, et al., 2020 [10]	Alice, Eastern Cape, South Africa	(i) Qualitative design (ii) Method: FGD (iii) Aim • to examine the health hazards associated with the contemporary traditional circumcision rite in Alice, Eastern Cape, South Africa	(i) Number of participants • 23 male and 2 female (ii) participant age • 18-70 years	Thematic analysis	**TMC and HIV risk** (i) HIV Risk • Initiates have to have sex with several sexually experienced women • Unhygienic environment in camp or bush during TMC practices •
Mshana, et al., 2011 [11]	North Eastern, Tanzania	(i) Qualitative design (ii) Method: FGD (iii) Aim • to understand how traditionally circumcising communities where MC carries considerable social meaning and significance would respond to male circumcision (MC) program as an additional intervention against HIV infection	(i) Number of participants • 41 men and 50 women (ii) participant age • 18-44 years	Thematic analysis	**TMC and impacts on men** (i) TMC • TMC as a cultural practice • Process of TMC • Reasons to undergo TMC (ii) impacts • Uncircumcised men experienced stigmatization and ridiculing
Munthali, et al., 2007 [12]	Malawi	(i) Qualitative and quantitative design(ii) Method: • Cross sectional survey •interview	(i) Number of participants • 102 men and women (ii) participant age • 12-19 years	Thematic analysis	**TMC and HIV risk** (i) TMC • TMC as a cultural practice • Reasons to undergo TMC

		(iii) Aim: • quantitative data is used to examine timing of pubertal changes for boys and girls and the extent to which puberty is marked by initiation ceremonies and rites in the country. • Quantitative data is used in order to understand how adolescents know about issues relating to sexuality and what meanings they attach to various puberty changes as they experience them.		Descriptive statistics	(ii) HIV risk • Initiates had sex without protection • Lack of knowledge on TMC and HIV transmission • TMC promotes sex adventure for new initiates
Nyembezi, et al., 2014 [13]	Eastern Cape, South Africa	(i) Quantitative design: • cross-sectional study (ii) Aim: • to explore past sexual behaviors, reported substance use, and beliefs about initiation and male circumcision with regard to HIV prevention	(i) Number of participants • 1656 men (ii) participant age • Mean age 21	Logistic regression	**TMC and HIV risk** (i) HIV risk factors • Initiates had multiple sex partners • Initiates engaged in inconsistent condom use or unprotected sex with multiple sex partners • Belief that TMC protects against HIV and other STIs transmission
Nyembezi, et al., 2009 [14]	Eastern Cape, South Africa	(i) Quantitative design: • cross-sectional study (ii) Aim: • to report on the prevalence of consistent condom use and identify its psychosocial correlates to inform future HIV prevention strategies among traditionally circumcised men in rural areas	(i) Number of participants • 114 men (ii) participant age • 15-32 years	Logistic regression	**TMC and HIV risk** (i) HIV risk factors • Belief that TMC protects against HIV transmission • Initiates engaged in unprotected sex with multiple sex partners

		of the Eastern Cape Province of South Africa.			
Peltzer, et al., 2009 [15]	Mpumalanga, South Africa	(i) Qualitative design (ii) Method: interview (iii) Aim: • to assess the current behavioural risk reduction messages and HIV/ AIDS education provided by medical and traditional providers of male circumcision • to assess the risk-related behavioural beliefs regarding circumcision, HIV/ AIDS risks, condoms, and gender attitudes among men who have undergone elective medical circumcision and men who have been circumcised in traditional initiation schools in the past 18 months.	(i) Number of participants • 30 men (ii) participant age • 18-30 years	Thematic analysis	**TMC, HIV risk, and impacts on men** **(i) TMC** • TMC as a cultural practice • Reasons to undergo TMC (ii) HIV risk • Belief that TMC reduces risk of contracting HIV • Initiates engaged in sex prior to incomplete wound healing • Initiated engaged in inconsistent condom use or unprotected sex with multiple partners (iii) impacts • TMC is associated with social status and being respect
Sarvestani, et al., 2012 [16]	Uganda	(i) Qualitative design (ii) Method: FGD (iii) Aim: • to characterize TMC practices in Uganda and the cultural implications	(i) Number of participants • 208 men (ii) participant age • 14-18 years	Thematic analysis	**TMC** (i) TMC • TMC as a cultural practice • The process of TMC

Shi, et al., 2019 [17]	Kenya, Lesotho, Malawi, Mozambique, Namibia, Rwanda, Tanzania, Uganda, Zambia and Zimbabwe	• (i) Quantitative design • Cross sectional study (iii) Aim: • to understand the sexual risk behavior of men with traditional male circumcision and medical male circumcision in the context of the World Health Organization's (WHO) campaign for voluntary medical male circumcision (VMMC) scale-up	(i) Number of participants • 43,222 males (ii) participant age • 15-49 years	Ordinal regression	**TMC and HIV risk** (i) HIV risk • Initiates engaged unprotected sex with multiple partners • Belief that TMC protects against HIV
Siweya, et al., 2018 [18]	Limpopo, South Africa	(i) Qualitative design (ii) Method: FGD (iii) Aim: • to determine the notions of manhood in TMC by African adolescent boys in Ngove Village, Limpopo Province	(i) Number of participants • 20 males (ii) participant age • 13-18 years	Thematic analysis	**TMC and HIV risk** (i) TMC • TMC as a cultural practice • The role of TMC in role modeling (ii) HIV risk • TMC promotes sex adventure for initiates

Supplementary File 2: Assessment of methodological quality (qualitative and quantitative studies) (n=16)

Authors	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	%
Greely, et al., 2013	Y	Y	Y	Y	Y	N	N	Y	Y	Y	80%
Gwata, 2009	Y	Y	Y	Y	Y	N	N	Y	U	Y	70 %
Kelly, et al., 2012	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	90%
Lagarde, et al., 2003	Y	Y	Y	Y	Y	Y	Y	Y			100%
Malisha, et al., 2008	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	90%
Mavundla et al., 2009	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	90%
Mavundla, et al.,2010	Y	Y	Y	Y	Y	N	N	Y	Y	Y	80 %
Mboera, et al., 2009	Y	Y	Y	Y	Y	Y	N	Y			87%
Mpateni, et al., 2020	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	90%
Mshana, et al, 2011	Y	Y	Y	Y	Y	N	N	Y	Y	Y	80%
Nyembezi, et al.,2009	Y	Y	Y	Y	Y	Y	Y	Y			100%
Nyembezi, et al., 2014	Y	Y	Y	Y	Y	Y	Y	Y			100%
Peltzer, et al., 2009	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
Amir, et al., 2012	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	90%
Shi, et al., 2020	Y	Y	Y	Y	Y	Y	Y	Y			100%
Siweya, et al., 2018	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	90%

Q= Question; Y= Yes; N= No; U= Unclear

The 2011 Mixed Method studies checklist (n=2)

Category of study	Methodological quality criteria	Responses		
		Yes	No	Can't tell
Douglas, et al., 2018				
Screening questions	Are there clear qualitative and quantitative research questions (or objectives), or a clear mixed methods question (or objective)?	Yes		
	Do the collected data allow address the research question (objective)? E.g., consider whether the follow-up period is long enough for the outcome to occur (for longitudinal studies or study components).	Yes		
1. Qualitative	1.1 Are the sources of qualitative data (archives, documents, informants, observations) relevant to address the research question (objective)?	Yes		
	1.2 Is the process for analyzing qualitative data relevant to address the research question (objective)?	Yes		
	1.3 Is appropriate consideration given to how findings relate to the context, e.g., the setting, in which the data were collected?	Yes		
	1.4 Is appropriate consideration given to how findings relate to researchers' influence, e.g., through their interactions with participants?	Yes		
	1.5. Is there coherence between qualitative data sources, collection, analysis and interpretation?	Yes		
2. Quantitative	2.1 Is the sampling strategy relevant to address the quantitative research question (quantitative aspect of the mixed methods question)?	Yes		
	2.2 Is the sample representative of the population understudy?			Can't tell
	2.3 Are measurements appropriate (clear origin, or validity known, or standard instrument)?	Yes		
	2.4. Is the statistical analysis appropriate to answer the research question (or objectives)?	Yes		
3. Mixed methods	3.1 Is the mixed methods research design relevant to address the qualitative and quantitative research questions (or objectives), or the qualitative and quantitative aspects of the mixed methods question (or objective)?	Yes		
	3.2 Is the integration of qualitative and quantitative data (or results) relevant to address the research question (objective)?	Yes		
	3.3 Is appropriate consideration given to the limitations associated with this integration, e.g., the divergence of qualitative and quantitative data (or results) in a triangulation design?	Yes		
	Overall	Yes		

Category of study	Methodological quality criteria	Responses		
		Yes	No	Can't tell
Munthali, et al., 2007				
Screening questions	Are there clear qualitative and quantitative research questions (or objectives), or a clear mixed methods question (or objective)?	Yes		
	Do the collected data allow address the research question (objective)? E.g., consider whether the follow-up period is long enough for the outcome to occur (for longitudinal studies or study components).	Yes		
1. Qualitative	1.1 Are the sources of qualitative data (archives, documents, informants, observations) relevant to address the research question (objective)?	Yes		
	1.2 Is the process for analyzing qualitative data relevant to address the research question (objective)?	Yes		
	1.3 Is appropriate consideration given to how findings relate to the context, e.g., the setting, in which the data were collected?	Yes		
	1.4 Is appropriate consideration given to how findings relate to researchers' influence, e.g., through their interactions with participants?	Yes		
	1.5. Is there coherence between qualitative data sources, collection, analysis and interpretation?	Yes		
2. Quantitative	2.1 Is the sampling strategy relevant to address the quantitative research question (quantitative aspect of the mixed methods question)?	Yes		
	2.2 Is the sample representative of the population understudy?			Can't tell
	2.3 Are measurements appropriate (clear origin, or validity known, or standard instrument)?	Yes		
	2.4. Is the statistical analysis appropriate to answer the research question (or objectives)?	Yes		
3. Mixed methods	3.1 Is the mixed methods research design relevant to address the qualitative and quantitative research questions (or objectives), or the qualitative and quantitative aspects of the mixed methods question (or objective)?	Yes		
	3.2 Is the integration of qualitative and quantitative data (or results) relevant to address the research question (objective)?	Yes		
	3.3 Is appropriate consideration given to the limitations associated with this integration, e.g., the divergence of qualitative and quantitative data (or results) in a triangulation design?	Yes		
	Overall	Yes		

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	2
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	3
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	3
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	4-5
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	4
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	3-4
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	5-6
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	7
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	4-5
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	N/A
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	N/A
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	5

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	N/A
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	N/A
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	5-6 & Fig. 1
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	7 & Table 3
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	N/A
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	7-14
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	N/A
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	N/A
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	N/A
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	14-16
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	17
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	17
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	N/A

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

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Traditional male circumcision and the risk for HIV transmission among men: a systematic review

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ABSTRACT

Objectives: to synthesise evidence to determine whether, in contrast to medical male circumcision, traditional male circumcision (TMC) practices may contribute to HIV transmission and what the impacts of TMC are on the initiates, their families and societies.

Design: Systematic review.

Data Source: PubMed, CINHAL, SCOPUS, ProQuest, Cochrane database, and Medline were searched between 15 – 30 October 2022.

Eligibility criteria: (i) studies involving young men, young male adults, male adults, and mixed male and female participants; (ii) studies on TMC involving men living with HIV (married and non-married); (iii) studies on TMC, HIV transmission and impact in Low- and Middle-Income Countries (LMICs); (iv) qualitative, quantitative and mixed method studies, and (v) studies aimed at exploring TMC and how it contributes to HIV transmission and the impacts of HIV on circumcised men and their families.

Data extraction: Data were extracted based on study details, study design, characteristics of participants, and results.

Result: A total of 18 studies were included: 11 were qualitative studies, 5 were quantitative studies, and 2 were mixed-method studies. All the studies included were conducted in areas where TMC was performed (17 in Africa and 1 in Papua New Guinea/PNG). The review's findings were categorised into themes: TMC as a cultural practice, consequences of not being traditionally circumcised on men and their families, and TMC-related risk of HIV transmission.

Conclusion: This systematic review highlights that TMC practice and HIV risk could negatively impact men and their families. Existing evidence suggests that little attention has been paid to men and their families experiencing the impacts of TMC and HIV risk factors. The findings recommend the need for health intervention programs such as safe circumcision and safe sexual behaviours following TMC and efforts to address psychological and social challenges in communities practising TMC.

Prospero Number Registration: CRD42022357788.

Strengths and limitations of this study

- This systematic review was based on the systematic literature search following Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA)
- The scientific quality of each included study was appraised using critical appraisal tools
- A large number of synonyms of TMC were included
- The literature review included articles published in English only

I. Introduction

Circumcision is a cultural practice older than written history can explain, can be traced back to pre-Abrahamic times, and can be found in many Judeo-Christian traditions in Africa [1, 2]. It may also be one of the world's oldest human surgical procedures [3]. It is a practice that has been widely performed on boys and young men by cutting off the foreskin of the penis as a rite of passage to mark the transition from childhood to manhood, primarily for religious and cultural reasons/beliefs [4, 5]. In many parts of the world, it has traditionally been practiced in Africa, Asia, Australia, Polynesia, and South and North America [3]. From the late 19th century onwards, circumcision is seen not only as a cultural or religious practice/identity but also as a public health approach [6]. In the 1980s, observational developed the hypothesis that circumcision might protect against human immunodeficiency virus (HIV) transmission [7, 8].

Male circumcision provides significant protection against HIV transmission and other sexually transmitted infections (STIs) in men [9-15]. This has been proven by randomised controlled trials in South Africa, Kenya, and Uganda [13, 16, 17], showing that circumcised males were less likely to become infected with HIV. As a result, male circumcision is increasingly recommended as a strategy to reduce HIV transmission, particularly in areas with a high prevalence of HIV [18-27]. A World Health Organization and the United Nations report has also highlighted a correlation between the lack of male circumcision and higher HIV rates, specifically in Eastern and Southern Africa [28]. Likewise, some meta-analyses showed that male circumcision protects significantly against HIV infection [29-31]. However, scepticism has also been raised regarding the protective effect of male circumcision on HIV transmission: some previous studies failed to prove the correlation between male circumcision and HIV infection prevention [32, 33], while another study falsely claimed that circumcision increased the risk of HIV transmission [34]. This false claim was strongly criticized as the study used simple data pooling that can lead to incorrect results [35-37]. Such scepticism seems also to be supported by some evidence from Japan and Scandinavian countries showing that the percentage of circumcised men is low, but the prevalence of HIV cases in these counties is also low [38]. However, when it comes to male circumcision and HIV infection in socioeconomically advanced countries, such as Scandinavian countries, as well as others in Europe, the UK, North America, and Australia, male circumcision is protective once sexual practice and sexual activity are taken into account, namely receptive anal intercourse by men who have sex with men (MSM) [39]. This is the primary source of HIV infection in such countries, and male circumcision would have no biological capacity to protect against transmission [39]. Furthermore, factors such as sexually active behaviours prior to circumcision, religion [40], history of STIs, and age [7] have been reported to be overlooked in

the findings of randomised trials. These factors have also been as supporting reasons for doubt about the strength of the relationship between male circumcision and HIV transmission prevention.

Similar to medical circumcision, the protective benefits of traditional male circumcision (TMC) have been a common question. Some evidence has suggested that TMC provides less or no protection from HIV transmission due to less amount of foreskin removed [41-43]. Newly traditionally circumcised males are also considered to have minimal protection if they have sexual intercourse before the wound heals completely [13, 44]. The possibility of acquiring HIV infection through TMC is also considered high due to sharing of a surgical knife or blade on multiple men [23, 45-48]. TMC refers to the procedure of removing the foreskin in males in a non-clinical way by traditional circumcisers without formal medical training [49]. In addition to preparing newly circumcised males for the transition to manhood, TMC symbolises new initiates officially being accepted in the community with a new status of being a man and becoming a good model in family and society [50-52]. TMC also denotes that new initiates have a greater social responsibility to their families and community, act as negotiators in community disputes, and have a chance to learn about the community's problems [18, 19]. These symbolisations highlight TMC as a sacred and secret rite. For example, in Africa, initiates are forbidden to talk with outsiders about the circumcision ritual and those who undergo the ritual as it will cause severe punishment imposed by the community [53, 54]. Similarly, sanctions will be imposed on females and non-circumcised males who gain information about the ritual [55]. To some extent, due to its sacredness, the further consequences of TMC practice have become a challenge for health intervention programs.

Studies on male circumcision and the risk for HIV transmission have been conducted in many parts of the world, including low- and middle-income countries (LMICs) and developed countries. The American Academy of Pediatrics and the US CDC have suggested that the health benefits of male circumcision outweigh the risk [56, 57]. They support parents who approved of infant male circumcision [56] and recommend male circumcision at any age for the health reason. Although TMC is still practised in several countries, and its healing process may have a high risk of HIV and other STIs transmission, to the authors' knowledge, there have been no published systematic reviews on TMC, HIV risk, and impacts on circumcised men and their families. Thus, the authors consider it essential to conduct a systematic review to synthesise evidence and determine whether, in contrast to medical male circumcision, TMC practices may contribute to HIV transmission and what the impacts of TMC are on the initiates, their families and societies. The review was conducted to address these specific questions: how does TMC practice contribute to HIV transmission? What are the implications of TMC on men, their families, and societies? To determine whether a previous systematic review exploring this theme had been completed or is in progress, we conducted a preliminary search in PubMed, CINHAL, and Scopus and found no published systematic reviews or systematic review protocols on this topic in LMICs and developed countries. We also searched the International Register of Systematic Reviews (PROSPERO) to identify underway or protocols of systematic reviews to avoid unintended duplication of reviews. Therefore, this systematic review is needed to fill the gap and to help

inform future health efforts at all levels, including health practitioners, researchers, and policy makers.

2. Methods

2.1 The Systematic Search Strategy

The protocol for the systematic review has been registered with PROSPERO (registration ID: CRD42022357788) [58]. The systematic search started with an initial search following the PICO (Population, Intervention, Comparison and Outcomes) framework, which has been used as part of the WHO guidelines development process to inform evidence-based practice. The systematic search was developed in collaboration with a health librarian expert, and the search terms were adjusted by each database. Databases searched included PubMed, CINHAL, SCOPUS, ProQuest Public Health, Cochrane Library, and Medline Complete - EBSCO. The search was limited to the English language, and with no year limit to capture as many articles as possible about circumcision, traditional male circumcision, HIV, and its impact on men and their families. The search strategies for the databases are in Appendix 1. Medical Subject Headings (MeSH) were used as part of the search strategies. The search terms were formulated using the combination of key terms or the synonym of each concept using boolean terms (OR, AND). In addition to electronic search, Google Scholar and Google were used to search grey literature using key terms, such as traditional male circumcision OR traditional circumcision. Reference lists of all relevant articles were also scrutinised to identify articles not recaptured by electronic database search. The search for databases was conducted from 15 – 30 October 2022. The combination of key terms for electronic database search, including the synonym of each concept, is in table 1.

Table 1. Search terms

Concept and search items
#1. Circumcision OR male circumcision OR traditional circumcision OR traditional initiation OR traditional male initiation OR TMC OR traditional male circumcision OR indigenous male circumcision OR traditionally circumcised OR traditionally circumcised male OR open circumcision OR traditional men circumcision OR sifon OR traditionally circumcised men OR traditionally circumcised husband OR traditional practice of male circumcision OR practice of traditional men circumcision OR ritual traditional circumcision OR ritual initiation
#2. HIV infect* OR HIV prevention OR HIV control OR human immunodeficiency virus OR AIDS OR sexually transmitted infections OR risk of HIV infection OR HIV transmission OR sexually transmitted diseas*
#3. impact* OR psychological wellbeing OR distress OR economic impacts OR social effect OR stigma OR discrimination OR unproductive husband OR loss of job OR loss income OR health impacts OR powerlessness OR worthlessness OR social distance OR social isolation OR stress OR mental health

#4. developing countries OR less developed OR disadvantaged OR resource limited OR poor OR low* OR middle income* OR region* OR area* OR low resource regions OR resource limited regions OR resource limited countr* OR developed countries OR pacific countries
Search combination #1 AND #2 AND #3 AND #4
The search will be applied in different databases: PubMed, CINHAL, SCOPUS, ProQuest, Cochrane database, and Medline.

2.2 Inclusion and Exclusion Criteria

The review included qualitative, quantitative, and mixed-method studies and evidence syntheses (systematic reviews). A summary of inclusion and exclusion criteria is shown in Table 2.

Table 2. Inclusion and exclusion criteria

PICO acronym	Inclusion criteria	Exclusion criteria
P-Population	Young men, young male adults, male adults, mixed participants males and females Studies on TMC involving men living with HIV (married and non-married) Mixed gender (male and female) but with explicit evidence on male	Infant, children, women, female
I- phenomenon of Interest	TMC, HIV transmission and impact	Medical circumcision and its impact and voluntarily medical male circumcision (VMMC)
Co-Context	LMICs and developed countries	
S-Study design	Qualitative, quantitative and mixed method studies. Literature reviews, reports, policy documents,	

	ethnography, anthropology and social study	
Language	English	Other than English
Purpose of study	Studies aiming at exploring the TMC and how it contributes to HIV transmission and the impacts of HIV on circumcised men and their families	Studies aiming at exploring HIV risk factors and impacts on women
Text	Full text available	Only abstract
Year publication	No year limit	

2.3 Data Screening

All the identified articles (Fig. 1) were collated and imported into EndNote X9 (Clarivate Analytics, PA, USA). The search identified 3,041 articles from databases and eight articles from other sources. Duplicates (n=690) were removed using EndNote. The titles and abstracts of the remaining 2,359 articles were screened by the first author and 2,118 articles were removed due to irrelevant populations and focus or aims. In total, 241 articles were examined in full text for eligibility by the first and second authors and disagreements were resolved through discussion among the three authors. Of this, 222 articles were excluded due to not meeting inclusion criteria. Nineteen articles fulfilling inclusion criteria were then assessed for methodological quality using critical appraisal tools developed by the Joanna Briggs Institute (JBI) for study design [59]. This led to the exclusion of one article not meeting the methodological quality, and the remaining 18 articles were included in the final review. The methodological quality assessment was performed by the authors GAA and NKF. Uncertainty was resolved through discussion among the three authors. The screening process of the articles is reported and presented according to the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) flow diagram (Figure 1) [60].

2.4 Data Extraction and Data Analysis

For each included article, data extraction was conducted with an extraction sheet. In the sheet, we recorded (i) study details: the last name of the first author, year of publication, study setting; (ii) study design: type of study, study aim, analysis methods; (iii) characteristics of participants: population, sex of participants, age of respondents; and (iv) results: the main themes, including TMC as a cultural practice, the impact of not being traditionally circumcised and the risk for HIV transmission (Supplementary File 1). The analysis followed three-stage procedures by Thomas and Harden framework [61]: (i) coding the text line by line, interpreting the data, and identifying concepts or themes; (ii) developing descriptive themes by groping similar concepts in theme and sub-theme; and (iii) generating analytical themes by reviewing

preliminary themes and discuss the addition or revision of the themes. The final analytical themes were then reviewed and decided, as presented below.

In general, the quality of methodological assessment of the included studies varied. Among the 18 studies, 5 studies reached 100% in assessment of methodological quality, 8 reached 90%, 4 reached 80%, and 1 reached 70%. The detail of methodological quality assessment can be seen in Supplementary File 2.

2.5 Patient and public involvement

This study used published studies and did not include patients and public involvement.

3. Result

3.1 Characteristics of Included Studies

All included articles were published in English from 2003 to 2020. Among the 18 included publications, 11 were qualitative studies [44, 62-71], 5 were quantitative studies [72-76] and 2 were mixed methods [77, 78]. All the included studies were conducted in areas where traditional male circumcision was performed. A total of 48,468 participants were involved in the review, of whom 1055 and 47,413, respectively, were involved in qualitative and quantitative studies. Eleven studies involved male only [65-70, 73-75, 77, 79], 7 studies involved men and women [44, 62-64, 72, 76, 78], 2 studies involved traditional circumcisers [64, 65], and 1 study involved health practitioners [64]. Participants' ages ranged from 13 to 70 years old. Of the 18 studies, 2 did not report the participants' age [62, 66]. Most of the studies (n=17) were conducted in Africa, while 1 was conducted in PNG [62].

Key findings were grouped into three main themes, including (i) TMC as a cultural practice, (ii) TMC and challenges of not being traditionally circumcised on men and family, and (iii) TMC and the risk for HIV transmission. Finally, knowledge gaps were identified.

3.2 TMC As a Cultural Practice

It is widely recognised that TMC is practised by various cultural groups among men as a rite of passage from childhood to adulthood. To the search, TMC is mainly practised in LMICs in Africa and PNG. Thirteen studies [44, 62, 63, 65, 66, 68-71, 76-78, 80] discussed TMC as a cultural practice: the process of TMC, TMC as a secret and sacred practice, and reasons to undergo TMC.

3.2.1 Process of TMC

Of the fourteen studies, seven [62, 63, 65, 66, 69, 70, 78] described three steps of the TMC ceremony, including the separation from family and community, transition, and incorporation into the family and community. In separation step, new initiates were taken to a mountain or camp for weeks or months [66, 78]. This long period was reported to be adequate time for the healing process and learning about manhood [66]. The separation was meant for new initiates to demonstrate survival skills, such as the ability to endure pain, which could improve men's qualities, such as strength, courage, respect and fortitude [63].

Transition process is a step where initiates were taught about the social norms, cultural knowledge and community expectation for them so that they can socialise with their nuclear family, friends, and community [70]. For example, a study in Papua New Guinea [62] found that new initiates were taught about what they have as a clan, such as their ancestral values and spirit, their clan's history, status, the land, the forest and the sea. Three studies [66, 69, 78] discussed expectations in initiate's families and communities after being traditionally circumcised, which is in line with a study [81] reporting new initiates were expected to be role models, have the ability to protect family, solve family disputes, and refuse tasks considered as a female domain. In the community, they were also expected to have a sense of belonging to the community, take greater responsibilities (avoiding criminal activities and abuse of women), be able to cooperate with elders and could face difficulties in the future.

In addition to learning about family and community, several studies [70, 78] reported that new initiates were taught about sexuality during the TMC ceremony. A study in Limpopo, South Africa [63] found that sexual socialisation during TMC emphasises on sexual control and sexual reserve rather than "permit to sex." For example, initiates were taught that if they did not wait a long time to have sexual intercourse after being circumcised, their foreskin would grow again, and therefore, they would have to undergo a new circumcision which is more painful [70]. However, other findings [70, 78] discovered that the emphasis on sexuality during circumcision had been changed with circumcision as a "license" for sex, including unsafe sex behaviours. These studies support the findings of another study reporting that traditionally circumcised men tended to assume that they had unlimited and unquestionable rights to have access to sex [81].

The incorporation process was marked by the return of initiates to the family and community. In South Africa [70], upon returning, new initiates wore a new dress code symbolising newly circumcised men reentering family and community as new individuals or transformed individuals who were ready to fulfill new roles in their society. This process is marked with a celebration by slaughtering animals (a goat or a sheep) as a sign of thanks to ancestors, family and community [66]. A study in Papua New Guinea found that incorporation was marked with having a celebration or party with family and community [62]. Celebration of successful traditional circumcision draws the symbolic power of being custodians of cultural practices resulting in the sense of community, social identity, and belonging [65].

Three studies [45, 65, 73] described TMC as an incomplete or partial circumcision, as only part of the foreskin was removed during circumcision. This is usually performed in non-clinical settings by traditional circumcisers without formal medical training. Having a partial foreskin is considered the same as not being circumcised as the foreskin keeps semen in the penis, thus, making them "dirty" and vulnerable to easily being infected with HIV and other STIs infections compared to full circumcision (medical circumcision) [65]. Findings showed that TMC, similar to medical circumcision, may reduce the risk of HIV and other STIs. The findings also showed that the amount of foreskin removed during the ceremony determines the extent of effectiveness against HIV transmission.

3.2.2 TMC As a Secret and Sacred Practice

Six studies [62, 63, 65, 66, 70, 76] described TMC as a sacred, secret, and compulsory cultural practice in communities. As a sacred and secret practice, TMC was conducted with certain rituals in certain places and performed by certain people (traditional circumcisers). In Tanzania, the traditional circumcisers were appointed by ancestors through dreams, and the skills were passed from one person to another through observation [65]. Meanwhile, in Xhosa, South Africa, the skills were taught by elder circumcisers through apprenticeship [66]. The ritual ceremony was performed by traditional circumcisers or clan leaders prior to circumcision. Similarly, as a compulsory practice, all men within the community were required to undergo such practice. Secretness is also marked by separation or isolation. Studies in Africa found that secretness is kept by isolating or separating new initiates from their families and communities [66, 70]. Similarly, a study in Papua New Guinea [62] found that TMC was performed in a designated home for the exclusive use of men, where only men were allowed to witness the actual process.

The cultural practice of TMC in Africa and Asia does not allow women to be around the ceremony and view or have knowledge of the process of TMC. It is believed that initiates will be affected by witchcraft and experience a slow recovery process if women were present during the ceremony. However, women in Papua New Guinea [62] were found to be highly knowledgeable about the whole process of TMC and able to explain in detail the cutting process, the procedures and the disposal of blood. The role of women in the community in Papua New Guinea was to start preparing for welcoming new initiates, such as making food, buying pigs to be eaten during the celebration, singing, dancing and giving gifts.

The sacredness of the TMC was reported to be related to the initiate's ancestors' intervention, as highlighted in two studies [65, 66]. In South Africa, ancestors were reported to be involved in the TMC process and wound healing following circumcision. Long-healing wounds or not healing correctly is associated with sexual impurity. For example, in Monduli, Tanzania [76], it was believed that the wound took two weeks to be completely healed for initiates who had not engaged in sexual intercourse before circumcision and took more than one month for the exposed ones. Due to this, in certain communities, initiates were asked to repent their sins so that the wound would heal quickly [66].

3.2.3 Reasons to Undergo TMC

Ten studies [44, 62, 65, 66, 68-71, 76, 77] describe rationales for TMC. These studies underlined an obligation to perform cultural rites to prepare new initiates for the responsibility of adulthood as the main reason for TMC. A qualitative study in South Africa [44] found that men and women underlined the importance of TMC to live up to cultural values and community expectations. They believed that traditionally circumcised men were more mature, less abusive, and more responsible than non-traditional circumcision as they had received teachings during ceremonies. Furthermore, learning social norms, cultural values and men's related values, such as being tough and brave to take risks, were aspects that were only found in traditional circumcision and not in

medical circumcision [82]. This reason seemed to influence initiates' resistance to modern medical circumcision. Expecting the privilege of being accepted and being together, such as having meals in the same dishes with the circumcised ones, was also a supporting factor for men to undergo TMC [77].

Four studies [76, 80, 83, 84] described economic reasons to undergo TMC. The low cost of TMC compared to medical circumcision was reported to affect the initiates' and their family's decision [83]. Evidence from South Africa showed that new initiates could not afford to pay for medical circumcision, and the amount of money charged by legal traditional circumcisers resulted in new initiates taking health risks by visiting illegal traditional circumcisers because they charge less [77]. Such evidence seemed to show that people who were economically vulnerable in traditional settings may only be able to access cheaper circumcision services with a high risk of complication and potential risk of HIV transmission. Nevertheless, in many cases, the cost charged for traditional circumcision did not include the time the wound was fully recovered, complications requiring further medical treatment, and celebration of full recovery [80].

Five studies [44, 62, 65, 69, 71] discussed the influence of women (e.g., girlfriends, future wives/partners), family, community and peers on men to undergo circumcision (TMC and medical circumcision). Evidence from South Africa showed that women often scheduled appointment for their boyfriend or husband to be traditionally circumcised [79]. Similarly, another finding in South Africa showed that women tended to undermine the manhood of non-circumcised males [69]. Also, findings in PNG showed that women prefer circumcised men for marriage and as sexual partners [62]. In addition to cultural reasons, women's preferences for circumcised men were related to pleasure and satisfaction during sexual intercourse compared to uncircumcised men [44]. This is in line with other systematic reviews reporting that women prefer circumcised men for multiple reasons, including sexual pleasure [85, 86]. Family, community and peers were also reported as significant influencers for young men to undergo TMC [65].

3.3 TMC and The Consequences of Not Being Traditionally Circumcised on Men and Their Families

Eleven studies [44, 62-65, 67, 68, 70, 72, 76, 87] described the challenges of not being traditionally circumcised, including psychological impacts and social challenges. The details about these aspects are presented below.

3.3.1 Psychological Challenges

Psychological impacts, including feelings of shame, stress, and embarrassment, were common negative challenges experienced by men who were not traditionally circumcised [88]. Such challenges were supported by experiences of being asked by friends about when to undergo TMC [88]. Another stressor for such psychological challenges included feeling obligated to undergo the ritual. Similarly, uncircumcised men were negatively affected by the community's perception of masculinity and adulthood.

Social pressures associated with traditional circumcision were another stressor for psychological challenges facing young people in some settings. Several studies described African adolescents and young men who experienced social pressure from their family and peers for being medically circumcised and uncircumcised [44, 65]. For example, several men acknowledged that they decided to be traditionally circumcised because their fathers or brothers had undergone circumcision, leading them to feel obligated to undergo the same ritual [70]. Others pointed to the respect for culture or system they grew up with, where all men underwent the same ritual [70]. In the Xhosa community in South Africa, uncircumcised men were often called cowards by friends of the same age [70]. Therefore, the decision to be traditionally circumcised was to avoid being harassed and ridiculed. In the family context, the pressure of young men to be traditionally circumcised stems from the desire to maintain family honour [67].

Another significant pressure was from women. Studies found that boys felt pressure when asked by girlfriends or partners about their circumcision status. A study in South Africa found that girls were undermined if dating and walking with uncircumcised boys [70]. Uncircumcised boys were also considered not ready building relationships with women [67]. Another finding in Africa also showed that circumcision is beneficial for women who were married to men who were cheating, as circumcision might protect against HIV transmission [70].

3.3.2 Social Challenges: Stigma, Discrimination and Disrespect

Seven studies [44, 62, 63, 67, 69, 70, 87] described stigma and discrimination related to TMC. A study in Xhosa, South Africa, noted that 70% of Xhosa initiates felt that they would experience stigmatisation if they were not traditionally circumcised [89]. In the same study setting, uncircumcised men and those who underwent medical circumcision were stigmatised as boys who were immature and impossible to distinguish them from 'real men' [67]. Similarly, uncircumcised men in PNG [62] felt ridiculed, mocked and people made fun of those who were not traditionally circumcised. Indeed, uncircumcised men in PNG are referred to as *utilusa* (foreskin) instead of using their actual name. Such impact was experienced by not only the initiates but also the initiates' families in which others in the community looked down on the initiates' father and family. For young uncircumcised men in Africa, stigma, discrimination, and rejection were reported to have caused long-term psychological effects reflected in anxiety, personality change and lack of confidence [67].

It is also reported that uncircumcised men were treated differently and assumed negatively, as reported in two studies [67, 70]. In the family and community, they were highly vulnerable, often blamed for inappropriate actions and considered incapable of moral worth. For example, uncircumcised men are often accused of being liars and thieves and treated like animals (dogs) in their community [67]. Another Africa study showed that uncircumcised men and those who underwent medical circumcision would not be accepted in the community, did not obtain rights and responsibility in their families, and had no rights to negotiate with elders [70]. Also, they were not allowed to start families within their community and to inherit and have property on their own [67]. Such negative impacts were reported to affect uncircumcised men psychologically, such as feeling embarrassed, disadvantaged and having low/no moral worth.

A couple of studies also suggested that uncircumcised men who underwent medical circumcision did not earn respect from the community [44, 70]. In some settings , it is considered proper for the community not to respect men who failed to follow the rite of passage, leading them to not receiving the same status as other men [44, 70]. Uncircumcised men and those who failed to follow the ritual would be marginalised from the traditional ceremony and community discussion [67]. These studies suggested that such consequences can lead to further psychological problems, such as sadness, low self-esteem, guilt, social withdrawal and frustration among traditionally uncircumcised men.

The social challenges, stigma, discrimination and expectation towards traditionally circumcised men underline cultural constructions of the penis and body, leading to the construction of masculinity and womanhood, which further raises issues of gender constructions [90]. The body functions metaphorically to symbolise social status, tribal affiliation, family position, and gender [90]. Rite of passage indicated by ritual and social transformation plays significant roles in social interaction within community [90].

3.4 TMC and the Risk for HIV Transmission

Nine studies [44, 63-65, 72, 73, 75, 76, 78] described (i) shared knife and bandage, unhygienic environment and the risk for HIV transmission; (ii) TMC promoted multiple sexual intercourses and increased sex partners, (iii) Belief in the protective effects of TMC against HIV/AIDS, and (iv) TMC and knowledge of HIV transmission.

3.4.1 Shared a Knife and Bandage, Unhygienic Environments and the Risk for HIV Transmission

Four studies [64, 65, 72, 76] highlighted the practice of one knife or blade used to circumcise several initiates. For example, most participants in a study in Tanzania reported that one knife was used in all TMC ceremonies [65]. Similarly, a quantitative study in South Africa showed that using one knife or blade to circumcise several initiates in one or several TMC ceremonies was reported to put initiates at high risk of being infected with HIV and other STIs as some of the initiates may have had unsafe sexual intercourse before circumcision and may already be HIV-positive [72]. However, another finding in a quantitative study [76] showed that some traditional circumcisers started using one knife or razor one for one initiate.

A study by Mpateni and Kang'ethe [64] also highlight the possibility of being infected with HIV and other infectious diseases through sharing bandage and unhygienic environments reflected in contaminated areas around the ceremony and using unwashed dishes to eat. Such poor environments were supported by the careless mistakes of traditional circumcisers who lacked knowledge of the importance of hygiene and how infectious diseases spread.

3.4.2 TMC Promotes Multiple Sexual Intercourses and Increases Sex Partners

Promoting multiple sexual intercourses in TMC was reported in five studies [44, 63, 64, 75, 78]. A qualitative study in Malawi [78] found stakeholders' concern about the role of the TMC ceremony in promoting sexual adventure among new initiates, asserting that circumcised men were not children anymore after they had sexual intercourse following circumcision. Similarly, there was also myths and false teaching that after being traditionally circumcised, initiates had to have sex with several females for testing of the penis [64]. As a result, many boys took this ceremony as a license to start having sex. This finding supports the finding of a study [63] that traditional initiation schools had a strong influence on initiates sexual behaviours. This strong sexual desire was reported to be supported by a considerable amount of time they spent in the bush or camp during TMC ceremonies without any contact with females [44]. Elsewhere, a qualitative study [44] found that traditionally circumcised men were told to have sexual intercourse without condoms to prove that they could enjoy flesh-to-flesh sex following the circumcision. As a result, some initiates continued to not use condoms following TMC.

Promoting sexual intercourse has led traditional initiates to increase the number of sex partners, as reported in two quantitative studies [73, 75]. The study in Kenya found that some initiates had more sexual desire following TMC, resulting in initiates increasing their number of sexual partners. Such practice was reported to increase the transmission of STIs [75]. The study suggests the need for the synergy between traditional rituals and medical intervention for HIV preventive practice.

3.4.3 Belief in the Protective Effects of TMC Against HIV and Condom Use

Belief in the protective effects of TMC against HIV/AIDS transmission was also a risk factor which further affects initiates' sexual behaviours. Four studies [70, 74, 75, 91] discussed about beliefs in the protective effects of TMC. Traditionally circumcised men tended to believe that TMC offers complete protection against HIV and other STIs and that circumcision is an alternative to condom use [91]. A quantitative study in Eastern Cape, South Africa, found that 97% of TMC initiates believed that TMC made initiates become 'real men' and did not need to use condoms during sexual intercourse [75]. A study in Sub-Saharan African countries [73] found that traditionally circumcised males were less likely to use condoms following circumcision. This is similar to Eastern Cape findings [74], reporting that TMM initiates were more likely to engage in risky sexual activities. Similarly, a cohort study in South Africa [75] found that 38% of traditionally circumcised men reported inconsistent condom use when having sex, and 8% reported never using condoms.

3.4.4 TMC and Knowledge of HIV Transmission

Lack of knowledge of HIV and other STIs among initiates and traditional circumcisers was reported in five studies [63-65, 73, 75]. Similar to medical circumcision, TMC initiates also believed that TMC protected them from STIs such as syphilis and gonorrhoea and enhanced personal hygiene [65]. A cohort study [75] found that new initiates who went through traditional circumcision were mainly for cultural reasons rather than HIV prevention.

The absence of information about HIV and other STIs prior to and after the circumcision was also reported as an HIV risk factor. For example, a study in Limpopo [63] found that traditional initiation schools did not provide information about sexual health and HIV/AIDS and other STIs but tended to encourage new initiates to engage in risky sexual activities. Safer sexual behaviours, such as condom use and being faithful to one sex partner, were not considered a part of initiation school programs. This was acknowledged by initiates, who said that they obtained information about condoms from local clinics and mass media [63]. A qualitative study in South Africa [70] found that the absence of information has led to a lack of understanding about the correlation between circumcision and HIV transmission.

Lack of knowledge of the mode of HIV transmission was not only in TMC initiates but also among traditional circumcisers, reflected in encouraging sex adventure, using one knife for several initiates, sharing bandages for several initiates, and ignorance of unhygienic environments [64]. A study in Tanzania [76] revealed that most traditional circumcisers did not associate traditional circumcision practice and HIV/AIDS, assuming that HIV/AIDS was an urban disease. However, another finding of the same study also showed that careless mistakes performed by traditional circumcisers by not using any protection, such as gloves, when cutting the foreskin of the penis increased the risk of HIV transmission.

4. Discussion

4.1 TMC Practices and HIV Transmission

The findings show evidence that TMC as a cultural practice remains practised in some communities in LMICs in Africa and Asia. The majority of the studies [44, 62-66, 68-71, 76-78, 80] reported that TMC in communities is not merely to cut off the foreskin but also to live up the tradition, keep the relationship with their ancestors, and to teach and inherit cultural values and the values of 'manhood' to new initiates. The practice of TMC is highly valued as a secret and sacred practice, taking weeks and months from the separation step until the new initiates return to the families and communities. Secretness and sacredness aspects in TMC may have led to difficulties in health intervention to control safety procedures. Such practice and its potential health risk factors reflect the community's high value on culture or tradition rather than any other type of medical or modern health intervention.

Studies in many Africa communities found that TMC is a compulsory practice where all men were required to be traditionally circumcised, leaving challenges at individual and family levels for those who did not undergo such practice. At the individual level, TMC causes psychological impacts for uncircumcised men and those who followed medical circumcision, including feeling ashamed, stressed, and pressured. These impacts were supported by the cultural values that put TMC as a standard of maturity for men. In addition to experiencing pressure from family and community, uncircumcised men also felt pressure from girls or women who preferred to build a relationship or to have sexual intercourse with traditionally circumcised men [44, 62, 65, 69]. Such impacts were also attributed to those who did not completely follow the process of TMC or mixed with medical circumcision. Although studies included in this review did not report the

challenges of TMC on families, it is plausible to argue that family would be impacted if young men within the family did not undergo TMC.

Not undergoing TMC could also lead to negative social challenges such as stigma, discrimination, and disrespect towards men [63, 67, 87]. For example, those who did not undergo TMC could be labelled immature, irresponsible and easily ridiculed, humiliated, and mocked. Traditionally uncircumcised men were stigmatised in families and communities as the cause of any crime or irresponsible actions. Similarly, they did not have full rights to discuss and negotiate with elders about families' and communities' problems. They are labelled and treated without respect (e.g., like a dog), implying that they are considered less than human. Such impacts are in line with the components of stigma, such as labelling human differences, hegemony of cultural practices associated labelled persons to undesirable characteristics, labelled persons being separated with the term "us" and "them", labelled persons experiencing loss of status and discrimination, and labelled persons experiencing difficulties in access to social, economic and political power [67, 92]. Similar to psychological impacts, all the studies included in the review mainly focus on stigma on initiates and thus less concern on stigma on the family. Stigma, discrimination, and disrespect experienced by initiates prior to circumcision and uncircumcised men also reflect a lack of social and psychological support from their families, friends, and communities.

TMC is generally assumed to have implications for HIV transmission [44, 63, 64, 72, 73, 75, 76, 78]. The unsafe procedure of TMC practices, such as using one knife to circumcise several initiates, not wearing gloves when circumcising initiates, and unhygienic environments, raise the concern of on potential spread of infectious diseases, including HIV [64, 72, 76]. In addition, to learn about culture and manhood in the transition period, initiates were also taught about exploring their sexuality, leading initiates to consider TMC as a 'gateway' to have unquestionable sex adventures and more than one sexual partner. For example, initiates were asked to have sexual intercourse with women who had sex before as reported in a previous study. For example, initiates were suggested to have sexual intercourse with women who have had sex before, which is in line with another study [93] reporting that initiates were required to have sexual intercourse without protection several days before the wound heals as a way to speed up the recovery process The correlation between TMC and the risk of HIV transmission is also related with the belief that TMC has the same protective effects as using a condom. This belief may also be supported by the sacredness aspect of the TMC rite, believing that the dead ancestors will intervene in the health of the initiates, as in line with previous studies [62, 76]. Another supporting factor for TMC and the risk of HIV transmission is the lack of knowledge on the mode of HIV transmission. In some communities, safe sexual behaviour was not part of the subjects taught during the TMC rite, leading initiates to not know HIV risk. This is in line with a finding in another study among 100 participants, of whom 67% were unaware of the risk of traditional circumcision for HIV transmission [94]. However, the risks for HIV transmission were also reported among initiates who knew about HIV transmission. Findings of a previous study suggest that circumcised men who had knowledge about HIV preventive measures of male circumcision and believed that male circumcision could reduce the risk of HIV infection were more likely to engage in risky sexual behaviours or sex without condoms with multiple partners [95]. The risks for HIV transmission in the practice of TMC reflect a lack of education, public awareness

campaigns and counseling for young men, parents, students, local leaders, and traditional circumcisers in the community practising TMC.

4.2 Implications for Future Intervention

The systematic review provides a range of negative impacts of not being traditionally circumcised on men and scant information about the effects on their families. Overall, the studies highlight psychological and social challenges that need to be addressed in communities practicing TMC. The studies also highlight TMC and the risk for HIV transmission, which require future health interventions.

This review shows that stigma, discrimination, and disrespect towards uncircumcised men or those who followed medical circumcision were within initiates' families and communities. This is because TMC is viewed as more prestigious than any other circumcision. It is suggested to have continuous counselling, approach, and education in communities where traditional beliefs and norms are still highly valued [63]. These approaches should reach families, communities and schools. In light of the TMC and the risk for HIV transmission, it is noted that in some communities, TMC has no role to play in preventing HIV and other STIs transmission, such as promoting multiple sexual intercourses, not using condoms, and believing the complete protection of circumcision against HIV transmission. To address this problem, education to target traditional circumcisers, traditional leaders, parents, and young men is required to improve the safe practice and prevent HIV transmission as reported in several studies [63, 80, 96]. Similarly, education on condom use and free, accessible condoms should also reach the camps where TMC practices were performed [63]. In addition, service delivery on providing free HIV testing for initiates in communities practicing TMC is needed.

4.3 Strengths and Limitations of the Study

Although many studies on male circumcision have been conducted mainly in Africa and some in Asia, this review is, as far as the researchers know, the first known study on TMC, the risk for HIV transmission and its impacts on them and their families. The use of six databases and multiple search terms helped the researchers conduct a comprehensive systematic review of the literature and provided a broad range of studies in LMICs. The inclusion of qualitative, quantitative, and mixed-method studies helps the researchers collate the current knowledge and identify knowledge gaps on the risk factors and impact of TMC on men and their families. Finally, the study selection methods and the appraisal process provided substantial evidence supporting the key findings reported in the literature review. However, the literature review only included articles published in English which may have narrowed the scope, and the authors may have missed the topic reported in other languages.

4.4 Implications for Future Studies

The literature review documents evidence and knowledge gaps about TMC, HIV risk, and its impact on men and their families. The literature review suggests that the previous studies mainly focus on the correlation between TMC and the risk for HIV transmission; none has explored TMC, HIV risk and its impacts on men and their families and none involved traditionally circumcised men living with HIV. Similarly, most included studies were in African settings, and only one was in PNG. Exploring TMC practice in different settings other than in Africa can help understand the similarities and differences of TMC practices and the implication of HIV transmission and its impact on men and their families. The review found very limited number of studies involved wives of married men who have done traditional circumcision and women that have unprotected sexual intercourse with newly traditionally circumcised men to explore their views and sexual practices about TMC. Furthermore, none of the included studies explored the views of health professionals and policy makers on TMC, its possible adverse health consequences and how these have been addressed at the policy level. Also, very limited studies explore traditional circumcisers' views on TMC and HIV risk. Future studies are required to fill these knowledge gaps, which may provide useful information for developing specific interventions for safer TMC and preventing HIV and other STIs transmission.

5. Conclusion

The review presents three main themes: TMC as a cultural practice, the consequences of not being traditionally circumcised, and the TMC-related risk of HIV transmission. These themes provide evidence that TMC and HIV risk could bring significant and negative challenges for men and their families. This review may be useful in designing programs to address social and psychological impacts associated with TMC practice in communities and supports the integration of health intervention with medical circumcision.

Contributors
Conceptualisation and the development of the protocol, Gregorius Abanit Asa (GAA), Nelsensius Klau Fauk (NKF), and Paul Russell Ward (PRW); Methodology, GAA, NKF and PRW; systematic search of the literature, GAA and NKF; formal analysis, GAA; writing-original draft preparation, GAA; writing-review and editing, GAA, NKF, and PRW; supervision, GAA, NKF, and PRW. All authors have read and agreed to the published version of the manuscript.

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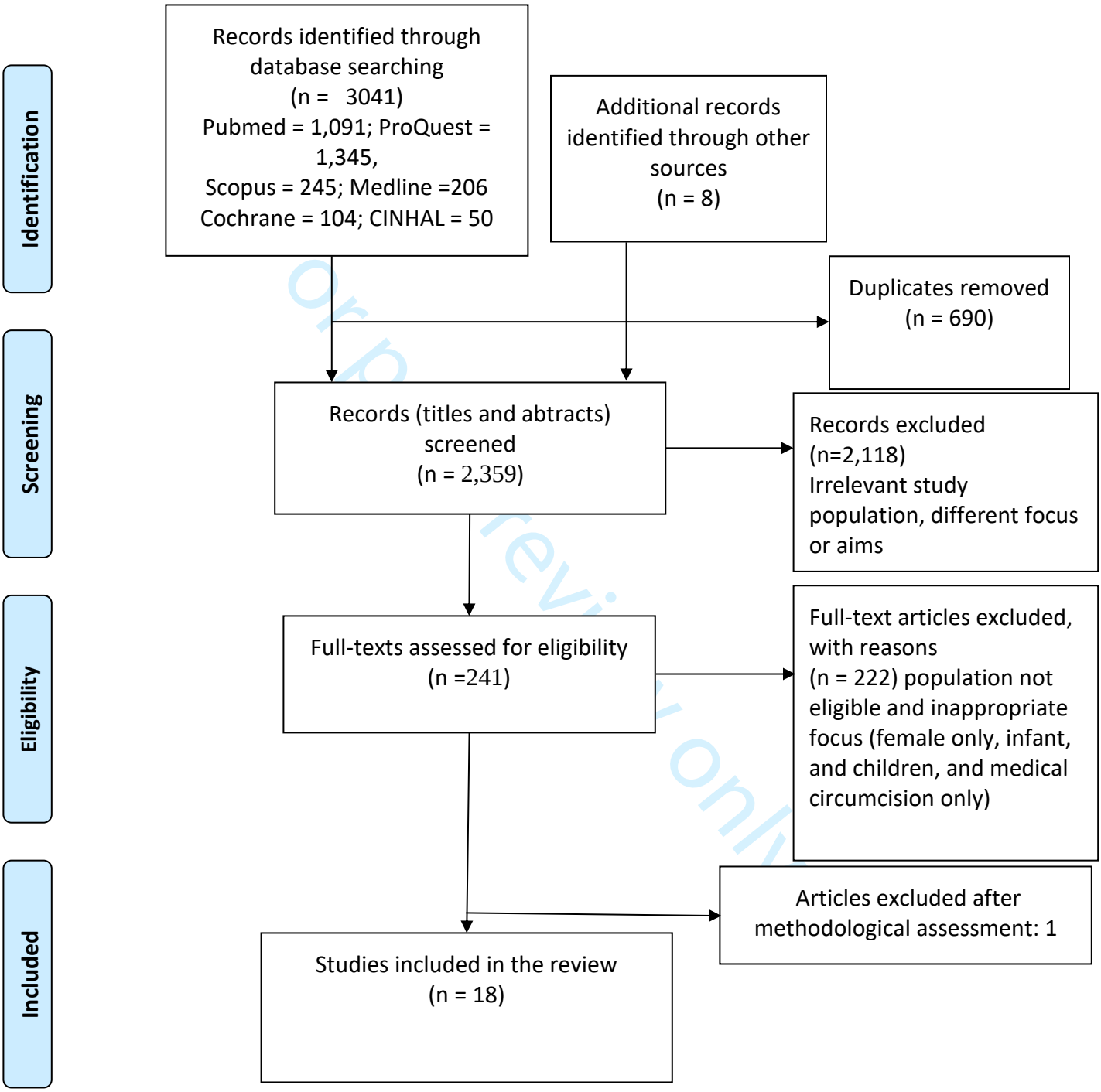
Figure 1: PRISMA Flow diagram of systematic literature search: records identified, removed, screened, and included in the review.



Appendix 1

Cochrane Database

ID	SEARCH	RESULT
#1	(Circumcision):ti,ab,kw	823
#2	(male circumcision):ti,ab,kw	644
#3	(Traditional circumcision):ti,ab,kw	28
#4	(traditional initiation):ti,ab,kw	530
#5	(traditional male initiation):ti,ab,kw	215
#6	(TMC):ti,ab,kw	153
#7	(traditional male circumcision):ti,ab,kw	22
#8	(indigenous male circumcision):ti,ab,kw	0
#9	(traditionally circumcised):ti,ab,kw	7
#10	(traditionally circumcised male):ti,ab,kw	7
#11	(open circumcision):ti,ab,kw	37
#12	(traditional men circumcision):ti,ab,kw	4
#13	(sifon):ti,ab,kw	1
#14	(traditionally circumcised men):ti,ab,kw	7
#15	(traditionally circumcised husband):ti,ab,kw	0
#16	(traditional practice of male circumcision):ti,ab,kw	4
#17	(practice of traditional men circumcision):ti,ab,kw	0
#18	(ritual traditional circumcision):ti,ab,kw	1
#19	(ritual initiation):ti,ab,kw	4
#20	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19	1,505
#21	(HIV infect*):ti,ab,kw	22,735
#22	(HIV prevention):ti,ab,kw	7,379
#23	(HIV control):ti,ab,kw	9,181
#24	(human immunodeficiency virus):ti,ab,kw	13,087
#25	(AIDS):ti,ab,kw	11,037
#26	(sexually transmitted infections):ti,ab,kw	1,782
#27	(risk of HIV infection):ti,ab,kw	4,161
#28	(HIV transmission):ti,ab,kw	2,970
#29	(sexually transmitted diseas*):ti,ab,kw	2,307
#30	#21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29	34,349
#31	(impact*):ti,ab,kw	140,990
#32	(psychological wellbeing):ti,ab,kw	7,265
#33	(distress):ti,ab,kw	24,913
#34	(economic impacts):ti,ab,kw	481

#35	(social effect):ti,ab,kw	18,607
#36	(stigma):ti,ab,kw	2,829
#37	(discrimination):ti,ab,kw	6,029
#38	(unproductive husband):ti,ab,kw	0
#39	(loss of job):ti,ab,kw	274
#40	(loss income):ti,ab,kw	717
#41	(health):ti,ab,kw	275,486
#42	(powerlessness):ti,ab,kw	55
#43	(worthlessness):ti,ab,kw	48
#44	(social distance):ti,ab,kw	1,128
#45	(social isolation):ti,ab,kw	1,536
#46	(stress):ti,ab,kw	69,129
#47	(mental health):ti,ab,kw	36,701
#48	#31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47	440,867
#49	(Developing countries):ti,ab,kw	4,556
#50	(less developed):ti,ab,kw	11,004
#51	(disadvantaged):ti,ab,kw	1,475
#52	(resource limited):ti,ab,kw	2,307
#53	(poor):ti,ab,kw	47,530
#54	(low*):ti,ab,kw	444,090
#55	(middle income*):ti,ab,kw	4,451
#56	(region*):ti,ab,kw	57,105
#57	(area*):ti,ab,kw	125,969
#58	(low resource regions):ti,ab,kw	86
#59	(resource limited regions):ti,ab,kw	62
#60	(resource limited countr*):ti,ab,kw	603
#61	(pacific countries):ti,ab,kw	206
#62	(developed countries):ti,ab,kw	3,507
#63	#49 OR #50 OR #51 OR #52 OR #53 OR #54 OR #55 OR #56 OR #57 OR #58 OR #59 OR #60 OR #61 OR #62	604,139
#64	**#20 AND #30 #48 AND #63**	**104**

Pubmed

ID	Search	Result
#1	Circumcision	9,524
#2	Male circumcision	7,140
#3	Traditional circumcision	724
#4	Traditional initiation	25,522

#5	Traditional male initiation	7,538
#6	TMC	18,118
#7	Traditional male circumcision	433
#8	Indigenous male circumcision	18
#9	Traditionally circumcised	104
#10	Traditionally circumcised male	85
#11	Open circumcision	189
#12	Traditional men circumcision	132
#13	Sifon	6
#14	Traditionally circumcised men	46
#15	Traditionally circumcised husband	3
#16	Traditional practice of male circumcision	231
#17	Practice of traditional men circumcision	89
#18	Ritual traditional circumcision	81
#19	Ritual initiation	376
#20	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19	53,328
#21	HIV infect*”	321, 398
#22	HIV prevention	110,968
#23	HIV control	118,789
#24	human immunodeficiency virus	414,981
#25	AIDS	295,363
#26	sexually transmitted infections	382,177
#27	risk of HIV infection	91,619
#28	HIV transmission	61,338
#29	sexually transmitted diseas*	47,282
#30	#21 OR #22 OR 23 #24 OR #25 OR #26 OR #27 OR #28 OR #29	606,521
#31	impact*	1,451,654
#32	psychological wellbeing	40,200
#33	distress	173,116
#34	economic impacts	134,222
#35	social effect	373,469
#36	stigma	35,752
#37	discrimination	328,352
#38	unproductive husband	3
#39	loss of job	3,248
#40	loss income	7,152
#41	health	5,932,617
#42	powerlessness	2,188
#43	worthlessness	907
#44	social distance	18,568

#45	social isolation	41,345
#46	stress	1,181,113
#47	mental health	471,114
#48	#31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47	8,094,384
#49	Developing countries	152,805
#50	less developed	397,001
#51	disadvantaged	115,498
#52	resource limited	112,693
#53	poor	753,973
#54	low*	2,817,510
#55	middle income*	78,651
#56	region*	2,238,390
#57	area*	1,819,969
#58	low resource regions	41,929
#59	resource limited regions	46,087
#60	resource limited countr*	17,754
#61	pacific countries	8,089
#62	developed countries	100,459
#63	#49 OR #50 OR #51 OR #52 OR #53 OR #54 OR #55 OR #56 OR #57 OR #58 OR #59 OR #60 OR #61 OR #62	7,164,066
#64	**#20 AND #30 AND #48 AND #63**	**1,091**

CINHAL (15/9/2022)

ID	Data search	Result
S1	Circumcision	2,744
S2	male circumcision	1,799
S3	traditional circumcision	69
S4	Traditional initiation	62
S5	Traditional male initiation	5
S6	TMC	279
S7	Traditional male circumcision	25
S8	Indigenous male circumcision	1
S9	Traditionally circumcised	15
S10	Traditionally circumcised male	3
S11	Open circumcision	2
S12	Traditional men circumcision	8
S13	Sifon	3
S14	Traditionally circumcised men	8

S15	Traditionally circumcised husband	28
S16	Traditional practice of male circumcision	4
S17	Practice of traditional men circumcision	863
S18	Ritual traditional circumcision	2
S19	Ritual initiation	14
S20	Circumcision OR male circumcision OR traditional circumcision OR traditional initiation OR traditional male initiation OR TMC OR traditional male circumcision OR indigenous male circumcision OR traditionally circumcised OR traditionally circumcised male OR open circumcision OR traditional men circumcision OR sifon OR traditionally circumcised men OR traditionally circumcised husband OR traditional practice of male circumcision OR practice of traditional men circumcision OR ritual traditional circumcision OR ritual initiation	3,085
S21	HIV infect*	90,037
S22	HIV prevention	26,675
S23	HIV control	24,023
S24	human immunodeficiency virus	126,951
S25	AIDS	72,540
S26	sexually transmitted infections	14,067
S27	risk of HIV infection	9,134
S28	HIV transmission	14,251
S29	sexually transmitted diseas*	17,446
S30	HIV infect* OR HIV prevention OR HIV control OR human immunodeficiency virus OR AIDS OR sexually transmitted infections OR risk of HIV infection OR HIV transmission OR sexually transmitted diseas*	175,524
S31	impact*	459,260
S32	psychological wellbeing	1,672
S33	distress	69,006
S34	economic impacts	6,098
S35	social effect	11,476
S36	stigma	28,392
S37	discrimination	39,690
S38	unproductive husband	1
S39	loss of job	1,187
S40	loss income	686
S41	Health impacts	44,686
S42	powerlessness	1,623
S43	worthlessness	228
S44	social distance	973
S45	social isolation	13,906
S46	stress	244,267

S47	mental health	180,215
S48	impact* OR psychological wellbeing OR distress OR economic impacts OR social effect OR stigma OR discrimination OR unproductive husband OR loss of job OR loss income OR health impacts OR powerlessness OR worthlessness OR social distance OR social isolation OR stress OR mental health	916,125
S49	Developing countries	32,517
S50	less developed	1,705
S51	disadvantaged	9,081
S52	resource limited	10,721
S53	poor	167,926
S54	low*	898,051
S55	middle income*	15,462
S56	region*	206,608
S57	area*	361,412
S58	low resource regions	39
S59	resource limited regions	119
S60	resource limited countr*	982
S61	pacific countries	580
S62	developed countries	13,338
S63	S49 OR S50 OR S51 OR S52 OR S53 OR S54 OR S55 OR S56 OR S57 OR S58 OR S59 OR S60 OR S61 OR S62	1,448,156
S64	(Circumcision OR “male circumcision” OR “traditional circumcision” OR “traditional initiation” OR “traditional male initiation” OR TMC OR “traditional male circumcision” OR “indigenous male circumcision” OR “traditionally circumcised” OR “traditionally circumcised male” OR “open circumcision” OR “traditional men circumcision” OR sifon OR “traditionally circumcised men” OR “traditionally circumcised husband” OR “traditional practice of male circumcision” OR “practice of traditional men circumcision” OR “ritual traditional circumcision” OR “ritual initiation”) AND (“HIV infect*” OR “HIV prevention” OR “HIV control” OR “human immunodeficiency virus” OR AIDS OR “sexually transmitted infections” OR “risk of HIV infection” OR “HIV transmission” OR “sexually transmitted diseas*”) AND (“impact*” OR “psychological wellbeing” OR distress OR “economic impacts” OR “social effect” OR stigma OR discrimination OR “unproductive husband” OR “loss of job” OR “loss income” OR “health impacts” OR powerlessness OR worthlessness OR “social distance” OR “social isolation” OR stress OR “mental health”) AND (“developing countries” OR “less developed” OR disadvantaged OR “resource limited” OR poor OR low* OR	50

	"middle income*" OR region* OR area* OR "low resource regions" OR "resource limited regions" OR "resource limited countr*" OR "developed countries" OR "pacific countries")	

Medline (15/09/22)

ID	Key Search	Result
S1	Circumcision	9,374
S2	male circumcision	6,065
S3	traditional circumcision	195
S4	Traditional initiation	165
S5	Traditional male initiation	12
S6	TMC	2,949
S7	Traditional male circumcision	61
S8	Indigenous male circumcision	2
S9	Traditionally circumcised	23
S10	Traditionally circumcised male	6
S11	Open circumcision	14
S12	Traditional men circumcision	12
S13	Sifon	5
S14	Traditionally circumcised men	13
S15	Traditionally circumcised husband	63
S16	Traditional practice of male circumcision	14
S17	Practice of traditional men circumcision	3,083
S18	Ritual traditional circumcision	8
S19	Ritual initiation	43
S20	Circumcision OR male circumcision OR traditional circumcision OR traditional initiation OR traditional male initiation OR TMC OR traditional male circumcision OR indigenous male circumcision OR traditionally circumcised OR traditionally circumcised male OR open circumcision OR traditional men circumcision OR sifon OR traditionally circumcised men OR traditionally circumcised husband OR traditional practice of male circumcision OR practice of traditional men circumcision OR ritual traditional circumcision OR ritual initiation	12,495
S21	HIV infect*	270,768
S22	HIV prevention	30,071
S23	HIV control	15,837
S24	human immunodeficiency virus	113,022
S25	AIDS	299,295

S26	sexually transmitted infections	36,312
S27	risk of HIV infection	14,681
S28	HIV transmission	22,859
S29	sexually transmitted diseas*	45,085
S30	HIV infect* OR HIV prevention OR HIV control OR human immunodeficiency virus OR AIDS OR sexually transmitted infections OR risk of HIV infection OR HIV transmission OR sexually transmitted diseas*	509,496
S31	impact*	1,446,702
S32	psychological wellbeing	2,963
S33	distress	162,321
S34	economic impacts	22,060
S35	social effect	27,700
S36	stigma	36,196
S37	discrimination	168,953
S38	unproductive husband	3
S39	loss of job	2,135
S40	loss income	1,788
S41	Health impacts	107,509
S42	powerlessness	1,391
S43	worthlessness	456
S44	social distance	4,093
S45	social isolation	24,605
S46	stress	1,141,833
S47	mental health	396,591
S48	impact* OR psychological wellbeing OR distress OR economic impacts OR social effect OR stigma OR discrimination OR unproductive husband OR loss of job OR loss income OR health impacts OR powerlessness OR worthlessness OR social distance OR social isolation OR stress OR mental health	3,099,234
S49	Developing countries	146,228
S50	less developed	10,682
S51	disadvantaged	16,667
S52	resource limited	34,488
S53	poor	699,351
S54	low*	4,964,973
S55	middle income*	35,250
S56	region*	2,226,728
S57	area*	1,811,466
S58	low resource regions	164
S59	resource limited regions	561
S60	resource limited countr*	3,538

S61	pacific countries	1,961
S62	developed countries	67,110
S63	developing countries OR less developed OR disadvantaged OR resource limited OR poor OR low* OR middle income* OR region* OR area* OR low resource regions OR resource limited regions OR resource limited countr* OR developed countries OR pacific countries	8,482,340
S64	(Circumcision OR male circumcision OR traditional circumcision OR traditional initiation OR traditional male initiation OR TMC OR traditional male circumcision OR indigenous male circumcision OR traditionally circumcised OR traditionally circumcised male OR open circumcision OR traditional men circumcision OR sifon OR traditionally circumcised men OR traditionally circumcised husband OR traditional practice of male circumcision OR practice of traditional men circumcision OR ritual traditional circumcision OR ritual initiation) AND (HIV infect* OR HIV prevention OR HIV control OR human immunodeficiency virus OR AIDS OR sexually transmitted infections OR risk of HIV infection OR HIV transmission OR sexually transmitted diseas*) AND (impact* OR psychological wellbeing OR distress OR economic impacts OR social effect OR stigma OR discrimination OR unproductive husband OR loss of job OR loss income OR health impacts OR powerlessness OR worthlessness OR social distance OR social isolation OR stress OR mental health) AND (developing countries OR less developed OR disadvantaged OR resource limited OR poor OR low* OR middle income* OR region* OR area* OR low resource regions OR resource limited regions OR resource limited countr* OR developed countries OR pacific countries)	206

Scopus (13/9/2022)

(TITLE-ABS-KEY (circumcision OR "male circumcision" OR "traditional circumcision" OR "traditional initiation" OR "traditional male initiation" OR tmc OR "traditional male circumcision" OR "indigenous male circumcision" OR "traditionally circumcised" OR "traditionally circumcised male" OR "open circumcision" OR "traditional men circumcision" OR sifon OR "traditionally circumcised men" OR "traditionally circumcised husband" OR "traditional practice of male circumcision" OR "practice of traditional men circumcision" OR "ritual traditional circumcision" OR "ritual initiation")) AND (TITLE-ABS-KEY ("HIV infect*" OR "HIV prevention" OR "HIV control" OR "human immunodeficiency virus" OR aids OR "sexually transmitted infections" OR "risk of HIV infection" OR "HIV transmission" OR "sexually transmitted diseas*")) AND (TITLE-ABS-KEY ("impact*" OR "psychological

wellbeing" OR distress OR "economic impacts" OR "social effect" OR stigma OR discrimination OR "unproductive husband" OR "loss of job" OR "loss income" OR "health impacts" OR powerlessness OR worthlessness OR "social distance" OR "social isolation" OR stress OR "mental health")) AND (TITLE-ABS-KEY ("developing countries" OR "less developed" OR disadvantaged OR "resource limited" OR poor OR low* OR "middle income*" OR region* OR area* OR "low resource regions" OR "resource limited regions" OR "resource limited countr*" OR "developed countries" OR "pacific countries"))

Result: 245

Proquest (15/09/2022)

noft(Circumcision OR “male circumcision” OR “traditional circumcision” OR “traditional initiation” OR “traditional male initiation” OR TMC OR “traditional male circumcision” OR “indigenous male circumcision” OR “traditionally circumcised” OR “traditionally circumcised male” OR “open circumcision” OR “traditional men circumcision” OR sifon OR “traditionally circumcised men” OR “traditionally circumcised husband” OR “traditional practice of male circumcision” OR “practice of traditional men circumcision” OR “ritual traditional circumcision” OR “ritual initiation”) AND (“HIV infect*” OR “HIV prevention” OR “HIV control” OR “human immunodeficiency virus” OR AIDS OR “sexually transmitted infections” OR “risk of HIV infection” OR “HIV transmission” OR “sexually transmitted diseas*”) AND (“impact*” OR “psychological wellbeing” OR distress OR “economic impacts” OR “social effect” OR stigma OR discrimination OR “unproductive husband” OR “loss of job” OR “loss income” OR “health impacts” OR powerlessness OR worthlessness OR “social distance” OR “social isolation” OR stress OR “mental health”) AND (“developing countries” OR “less developed” OR disadvantaged OR “resource limited” OR poor OR low* OR “middle income*” OR region* OR area* OR “low resource regions” OR “resource limited regions” OR “resource limited countr*” OR “developed countries” OR “pacific countries”)

Result: 1345

Supplementary File 1

Author/year	Study Location	Study Design/Study Aim	Number/Age of Participants	Analysis	Main Themes of TMC, HIV risk, Impacts on Men and Their Families
Douglas, et al., 2018 [1]	Eastern Cape, South Africa	(i) Mixed method design (ii) Methods: • Cross-sectional survey • Focus group discussion (FDG) (iii) Aim: • to describe social determinants and explore economic determinants related to traditional circumcision of boys from 12 to 18 years of age in Libode rural communities in Eastern Cape Province	(i) Number of participants • 1036 men (ii) Participant age • 12-18 years old	Thematic analysis Descriptive statistics	**TMC and HIV risk** (i) TMC • TMC as a cultural practice • Reasons to undergo TMC (ii) HIV Risk • Initiates have no knowledge on TMC and HIV transmission • Initiates have no opportunities to talak about TMC and HIV risks
Greely, 2013 [2]	South Africa	(i) Qualitative design (ii) Method: FGD (iii) Aim: • to understand the importance of male circumcision as a risk-reducing strategy by exploring perceptions of young men and women	(i) Number of participants • 15 participants (10 men and 5 women) (ii) Participant age • 15 years and above	Thematic Analysis	**TMC, HIV risk, impacts on men and their families** (i) TMC • TMC as a rite of passage to adulthood • TMC defines being a 'real' man • Traditional initiates receive teaching and guidance from elders • Initiates received more respects • To fulfill or live up to cultural expectations (ii) HIV risk • Initiates were taught to have sexual intercourse • Initiates were keen to prove manhood with unprotective sex intercourse

					• The belief that TMC reduced risk of HIV transmission (iii) Impacts • Uncircumcised men were subject to stigma, discrimination, and disrespect • Uncircumcised men were haunted by bad luck • Women believed traditionally circumcised men are more responsible and less abusive
Gwata, 2009 [3]	Xhosa, South Africa	(i) Qualitative design (ii) Method: interview (iii) Aim • to explore the socio-cultural perceptions of Xhosa-speaking men on traditional male circumcision	(i) Number of participants • 5 men (ii) Participant age • 19-30 years	Thematic analysis	**TMC and HIV risk** (i) TMC • TMC as an agent of socialization within community • TMC tests man's ability to endure pain • Initiates experienced social pressure to undergo TMC (ii) HIV risk • Lack of knowledge on TMC and HIV transmission •
Kelly, et al., 2012 [4]	Papua New Guinea	(i) Qualitative design (ii) Method: • interview and FGD (iii) Aim • to map contemporary MC and other penile cutting practices, and the socio-cultural dimensions underpinning these practices	(i) Number of participants • 276 men (51 men underwent TMC) • 210 women (ii) Participant age Not reported	Thematic analysis	**TMC, HIV risk, impacts on men and their families** (i) TMC • TMC is a compulsory practice • TMC is sacred and secret practice (ii) HIV risk • Reusing of non-sterile cutting equipment • Lack of knowledge of risk of non-sterile equipment and HV transmission (iii) Impacts

					• Uncircumcised men felt stigmatized, ridiculed, and mocked • Family members of uncircumcised men were looked down within the community
Lagarde, et al., 2003 [5]	South Africa	(i) Quantitative design: • cross sectional study (ii) Aim • to measure the prevalence and associated factors of MC in a South African township, and to assess its acceptability as a tool for HIV prevention	(i) Number of participants • 482 men (108 underwent TMC) and 302 women (ii) Participant age • 19-29 years	Multivariate analysis	**HIV risk and impacts on men** (i) HIV risk • Circumcised men did not need to use condoms • The belief that TMC protected against HIV transmission • Initiates had sex during healing period (ii) Impacts • TMC proved manhood Initiates obtained respect from peers and women
Malisha et al., 2008 [6]	Limpopo, South Africa	(i) Qualitative design (ii) Method: interview (iii) Aim • to investigate the role and significance of traditional initiation schools from the perspectives of young people in Venda, a part of South Africa where initiation schools, for some young people, still form an important part of the rite of passage to adulthood.	(i) Number of participants • 17 men and 17 women (ii) participant age • 13-20 years	Thematic analysis	**TMC, HIV risk and impacts on men** (i) TMC • TMC prepares initiates to be a 'real' man • Initiation school is important for socialization (ii) HIV risk • Initiation schools encouraged initiates to engage in sexual activities • Lack of information on HIV and condom use during initiation school • Initiates engaged in sexual intercourse without a condom • Traditional healers did not use sterilised equipment. (iii) Impacts

					• Uncircumcised men experienced rejection • Uncircumcised men were considered not a 'real' man, irresponsible
Mavundla, et al., 2009 [7]	Xhosa, South Africa	(i) Qualitative design (ii) Method: interview (iii) Aim • to explore and describe Xhosa beliefs and practices regarding cultural male circumcision ritual in the Eastern Cape Province in South Africa to support nurses in providing culturally competent care	(i) Number of participants • 25 men (ii) participant age • Not reported	Thematic analysis	**TMC and impacts on men** (i) TMC • Process of TMC • TMC as a sacred and secret cultural practice • TMC did not allow initiates to seek for medical treatment • Expectation following being traditionally circumcised • TMC connects initiates with ancestors (ii) impacts • Uncircumcised men experienced rejection and negative labeling • Circumcised men obtained respect
Mavundla, et al., 2010 [8]	East London, South Africa	(i) Qualitative design (ii) Method: interview (iii) Aim • to describe the experience of newly initiated Xhosa men in East London, South Africa	(i) Number of participants • 14 men (ii) participant age • 15-20 years	Thematic analysis	**TMC and impacts on men** (i) TMC • TMC as a cultural practice (ii) impacts • Uncircumcised men experienced stigma rejection by family, community, peers, opposite sex • Uncircumcised men experienced lack of respect
Mboera et al., 2009 [9]	Tanzania	(i) Quantitative design: • Cross sectional study (ii) Aim • to underscore challenges and opportunities for the involvement of traditional	(i) Number of participants • 324 men and 277 women (ii) participant age • 12-45 years	Thematic analysis	**TMC, HIV risk, and impacts on men and their families** (i) TMC • TMC as a cultural practice • Reasons to undergo TMC (ii) HIV risk

		practitioners in scaling up safe male circumcision as a measure to support global efforts of preventing HIV transmission			• Using the same knife to circumcise several initiates • Lack of knowledge of the possibility of HIV transmission through TMC (iii) impacts • Uncircumcised men were segregated by community • Uncircumcised men experienced lack of respect •
Mpateni, et al., 2020 [10]	Alice, Eastern Cape, South Africa	(i) Qualitative design (ii) Method: FGD (iii) Aim • to examine the health hazards associated with the contemporary traditional circumcision rite in Alice, Eastern Cape, South Africa	(i) Number of participants • 23 male and 2 female (ii) participant age • 18-70 years	Thematic analysis	**TMC and HIV risk** (i) HIV Risk • Initiates have to have sex with several sexually experienced women • Unhygienic environment in camp or bush during TMC practices •
Mshana, et al., 2011 [11]	North Eastern, Tanzania	(i) Qualitative design (ii) Method: FGD (iii) Aim • to understand how traditionally circumcising communities where MC carries considerable social meaning and significance would respond to male circumcision (MC) program as an additional intervention against HIV infection	(i) Number of participants • 41 men and 50 women (ii) participant age • 18-44 years	Thematic analysis	**TMC and impacts on men** (i) TMC • TMC as a cultural practice • Process of TMC • Reasons to undergo TMC (ii) impacts • Uncircumcised men experienced stigmatization and ridiculing
Munthali, et al., 2007 [12]	Malawi	(i) Qualitative and quantitative design(ii) Method: • Cross sectional survey •interview	(i) Number of participants • 102 men and women (ii) participant age • 12-19 years	Thematic analysis	**TMC and HIV risk** (i) TMC • TMC as a cultural practice • Reasons to undergo TMC

		(iii) Aim: • quantitative data is used to examine timing of pubertal changes for boys and girls and the extent to which puberty is marked by initiation ceremonies and rites in the country. • Quantitative data is used in order to understand how adolescents know about issues relating to sexuality and what meanings they attach to various puberty changes as they experience them.		Descriptive statistics	(ii) HIV risk • Initiates had sex without protection • Lack of knowledge on TMC and HIV transmission • TMC promotes sex adventure for new initiates
Nyembezi, et al., 2014 [13]	Eastern Cape, South Africa	(i) Quantitative design: • cross-sectional study (ii) Aim: • to explore past sexual behaviors, reported substance use, and beliefs about initiation and male circumcision with regard to HIV prevention	(i) Number of participants • 1656 men (ii) participant age • Mean age 21	Logistic regression	**TMC and HIV risk** (i) HIV risk factors • Initiates had multiple sex partners • Initiates engaged in inconsistent condom use or unprotected sex with multiple sex partners • Belief that TMC protects against HIV and other STIs transmission
Nyembezi, et al., 2009 [14]	Eastern Cape, South Africa	(i) Quantitative design: • cross-sectional study (ii) Aim: • to report on the prevalence of consistent condom use and identify its psychosocial correlates to inform future HIV prevention strategies among traditionally circumcised men in rural areas	(i) Number of participants • 114 men (ii) participant age • 15-32 years	Logistic regression	**TMC and HIV risk** (i) HIV risk factors • Belief that TMC protects against HIV transmission • Initiates engaged in unprotected sex with multiple sex partners

		of the Eastern Cape Province of South Africa.			
Peltzer, et al., 2009 [15]	Mpumalanga, South Africa	(i) Qualitative design (ii) Method: interview (iii) Aim: • to assess the current behavioural risk reduction messages and HIV/ AIDS education provided by medical and traditional providers of male circumcision • to assess the risk-related behavioural beliefs regarding circumcision, HIV/ AIDS risks, condoms, and gender attitudes among men who have undergone elective medical circumcision and men who have been circumcised in traditional initiation schools in the past 18 months.	(i) Number of participants • 30 men (ii) participant age • 18-30 years	Thematic analysis	**TMC, HIV risk, and impacts on men** **(i) TMC** • TMC as a cultural practice • Reasons to undergo TMC (ii) HIV risk • Belief that TMC reduces risk of contracting HIV • Initiates engaged in sex prior to incomplete wound healing • Initiated engaged in inconsistent condom use or unprotected sex with multiple partners (iii) impacts • TMC is associated with social status and being respect
Sarvestani, et al., 2012 [16]	Uganda	(i) Qualitative design (ii) Method: FGD (iii) Aim: • to characterize TMC practices in Uganda and the cultural implications	(i) Number of participants • 208 men (ii) participant age • 14-18 years	Thematic analysis	**TMC** (i) TMC • TMC as a cultural practice • The process of TMC

Shi, et al., 2019 [17]	Kenya, Lesotho, Malawi, Mozambique, Namibia, Rwanda, Tanzania, Uganda, Zambia and Zimbabwe	• (i) Quantitative design • Cross sectional study (iii) Aim: • to understand the sexual risk behavior of men with traditional male circumcision and medical male circumcision in the context of the World Health Organization's (WHO) campaign for voluntary medical male circumcision (VMMC) scale-up	(i) Number of participants • 43,222 males (ii) participant age • 15-49 years	Ordinal regression	**TMC and HIV risk** (i) HIV risk • Initiates engaged unprotected sex with multiple partners • Belief that TMC protects against HIV
Siweya, et al., 2018 [18]	Limpopo, South Africa	(i) Qualitative design (ii) Method: FGD (iii) Aim: • to determine the notions of manhood in TMC by African adolescent boys in Ngove Village, Limpopo Province	(i) Number of participants • 20 males (ii) participant age • 13-18 years	Thematic analysis	**TMC and HIV risk** (i) TMC • TMC as a cultural practice • The role of TMC in role modeling (ii) HIV risk • TMC promotes sex adventure for initiates

Supplementary File 2: Assessment of methodological quality (qualitative and quantitative studies) (n=16)

Authors	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	%
Greely, et al., 2013	Y	Y	Y	Y	Y	N	N	Y	Y	Y	80%
Gwata, 2009	Y	Y	Y	Y	Y	N	N	Y	U	Y	70 %
Kelly, et al., 2012	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	90%
Lagarde, et al., 2003	Y	Y	Y	Y	Y	Y	Y	Y			100%
Malisha, et al., 2008	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	90%
Mavundla et al., 2009	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	90%
Mavundla, et al.,2010	Y	Y	Y	Y	Y	N	N	Y	Y	Y	80 %
Mboera, et al., 2009	Y	Y	Y	Y	Y	Y	N	Y			87%
Mpateni, et al., 2020	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	90%
Mshana, et al, 2011	Y	Y	Y	Y	Y	N	N	Y	Y	Y	80%
Nyembezi, et al.,2009	Y	Y	Y	Y	Y	Y	Y	Y			100%
Nyembezi, et al., 2014	Y	Y	Y	Y	Y	Y	Y	Y			100%
Peltzer, et al., 2009	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
Amir, et al., 2012	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	90%
Shi, et al., 2020	Y	Y	Y	Y	Y	Y	Y	Y			100%
Siweya, et al., 2018	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	90%

Q= Question; Y= Yes; N= No; U= Unclear

The 2011 Mixed Method studies checklist (n=2)

Category of study	Methodological quality criteria	Responses		
		Yes	No	Can't tell
Douglas, et al., 2018				
Screening questions	Are there clear qualitative and quantitative research questions (or objectives), or a clear mixed methods question (or objective)?	Yes		
	Do the collected data allow address the research question (objective)? E.g., consider whether the follow-up period is long enough for the outcome to occur (for longitudinal studies or study components).	Yes		
1. Qualitative	1.1 Are the sources of qualitative data (archives, documents, informants, observations) relevant to address the research question (objective)?	Yes		
	1.2 Is the process for analyzing qualitative data relevant to address the research question (objective)?	Yes		
	1.3 Is appropriate consideration given to how findings relate to the context, e.g., the setting, in which the data were collected?	Yes		
	1.4 Is appropriate consideration given to how findings relate to researchers' influence, e.g., through their interactions with participants?	Yes		
	1.5. Is there coherence between qualitative data sources, collection, analysis and interpretation?	Yes		
2. Quantitative	2.1 Is the sampling strategy relevant to address the quantitative research question (quantitative aspect of the mixed methods question)?	Yes		
	2.2 Is the sample representative of the population understudy?			Can't tell
	2.3 Are measurements appropriate (clear origin, or validity known, or standard instrument)?	Yes		
	2.4. Is the statistical analysis appropriate to answer the research question (or objectives)?	Yes		
3. Mixed methods	3.1 Is the mixed methods research design relevant to address the qualitative and quantitative research questions (or objectives), or the qualitative and quantitative aspects of the mixed methods question (or objective)?	Yes		
	3.2 Is the integration of qualitative and quantitative data (or results) relevant to address the research question (objective)?	Yes		
	3.3 Is appropriate consideration given to the limitations associated with this integration, e.g., the divergence of qualitative and quantitative data (or results) in a triangulation design?	Yes		
	Overall	Yes		

Category of study	Methodological quality criteria	Responses		
		Yes	No	Can't tell
Munthali, et al., 2007				
Screening questions	Are there clear qualitative and quantitative research questions (or objectives), or a clear mixed methods question (or objective)?	Yes		
	Do the collected data allow address the research question (objective)? E.g., consider whether the follow-up period is long enough for the outcome to occur (for longitudinal studies or study components).	Yes		
1. Qualitative	1.1 Are the sources of qualitative data (archives, documents, informants, observations) relevant to address the research question (objective)?	Yes		
	1.2 Is the process for analyzing qualitative data relevant to address the research question (objective)?	Yes		
	1.3 Is appropriate consideration given to how findings relate to the context, e.g., the setting, in which the data were collected?	Yes		
	1.4 Is appropriate consideration given to how findings relate to researchers' influence, e.g., through their interactions with participants?	Yes		
	1.5. Is there coherence between qualitative data sources, collection, analysis and interpretation?	Yes		
2. Quantitative	2.1 Is the sampling strategy relevant to address the quantitative research question (quantitative aspect of the mixed methods question)?	Yes		
	2.2 Is the sample representative of the population understudy?			Can't tell
	2.3 Are measurements appropriate (clear origin, or validity known, or standard instrument)?	Yes		
	2.4. Is the statistical analysis appropriate to answer the research question (or objectives)?	Yes		
3. Mixed methods	3.1 Is the mixed methods research design relevant to address the qualitative and quantitative research questions (or objectives), or the qualitative and quantitative aspects of the mixed methods question (or objective)?	Yes		
	3.2 Is the integration of qualitative and quantitative data (or results) relevant to address the research question (objective)?	Yes		
	3.3 Is appropriate consideration given to the limitations associated with this integration, e.g., the divergence of qualitative and quantitative data (or results) in a triangulation design?	Yes		
	Overall	Yes		

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	2
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	3
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	3
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	4-5
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	4
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	3-4
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	5-6
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	7
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	4-5
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	N/A
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	N/A
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	5

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	N/A
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	N/A
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	5-6 & Fig. 1
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	7 & Table 3
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	N/A
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	7-14
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	N/A
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	N/A
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	N/A
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	14-16
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	17
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	17
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	N/A

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